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ITEM 7:* PROGRAMME MATTERS, INCLUDING THE IMPLEMENTATION OF THE PLAN OF ACTION TO COMBAT DESERTIFICATION

STRATEGIES FOR THE PROTECTION AND DEVELOPMENT OF THE OCEANS AND COASTAL AREAS

Note by the Executive Director

As requested by the Governing Council in its decision 16/26 B of 31 May 1991, the Executive Director submits herewith for information the completed report on strategies for the protection and development of the oceans and coastal areas.

The first incomplete draft of this document was presented for information (as document IOC/INF-841prov.) to the sixteenth session of the Intergovernmental Oceanographic Commission of UNESCO (IOC) Assembly (Paris, 7-22 March 1991). The Assembly took note of the draft, welcomed the joint initiative of the secretariats of IOC and UNEP, and encouraged the secretariat of IOC to pursue the completion of the document in cooperation with UNEP.

The draft of the highlights of the document was also submitted (as document UNEP/GC.16/21/Add.5) to the sixteenth session of the UNEP Governing Council (Nairobi, 20-31 May 1991). The Council welcomed the cooperation between IOC and UNEP on the preparation of the strategies, approved the completion of the strategy document and requested its submission to the next session of the Council and the Preparatory Committee of United Nations Conference on Environment and Development (UNCED) at its fourth session (March/April 1992).

The secretariat of UNCED was regularly kept informed about the progress in the preparation of this joint IOC/UNEP document, which contributed signif antly to the preparations for UNCED.

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* Refers to the number of the item on the Provisional Agenda (UNEP/GC.17/1).

S T R A T E G I E S

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1. PREAMBLE

1.1 The United Nations Environment Programme (UNEP) and the Intergovernmental Oceanographic Commission of UNESCO (IOC) are major United Nations bodies which have versatile and multifaceted programmes dealing with oceans and coastal areas. The common experience of both organizations, based on more than a decade of fruitful and close cooperation in numerous joint programmes, has confirmed that meaningful and lasting environmental protection is indeed inseparably linked with social and economic development. Against this background, and as part of IOC's and UNEP's preparations for the 1992 United Nations Conference on Environment and Development (UNCED), an attempt was made by the secretariats of UNEP and IOC to analyze the present problems of the marine and coastal environment and to formulate strategies which may contribute to the solution of these problems, taking into account the issues raised in General Assembly resolution 44/228. The causes of the problems are often beyond the scope of IOC and UNEP, as are many of the strategies for addressing these problems. Nevertheless, ***it is expected that the present document will provide a useful guide for common strategies of UNEP and IOC in dealing with marine and coastal affairs and thus will strengthen the capacity of these organizations, and the United Nations system as a whole, to respond in a more concerted and coherent way to the present and forthcoming environmental problems.***

2. HIGHLIGHTS

Importance of the oceans, coastal areas, and their resources

2.1 The oceans have always had and will continue to play a decisive role in shaping the life on this planet. The global energy budget and the biogeochemical processes on which all life depends are critically influenced by the oceans.

2.2 The interactions between the oceans and the coastal terrestrial environment are numerous and very intimate. The ecological systems of the oceans are inseparably linked with those in coastal areas and the socio-economic developments of the coastal areas are determined to a large degree by the conditions created by the proximity of the oceans. Nowhere is this mutual interdependence and influence so evident as in the coastal and near-shore zones of enclosed and semi-enclosed seas, and on islands. Therefore the protection of the marine environment and the use of its resources cannot be considered separately from land-based activities.

2.3 The near-shore maritime areas contain the largest part of commercially exploitable marine living and mineral resources. They are also the zones used for mariculture, whose potential is yet to be fully developed.

2.4 Due to the numerous advantages offered by the coastal and near-shore areas,[1] they have since antiquity been among the most intensively used and abused parts of our globe. More than half of today's population lives on

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[1] In the context of this document the term "open oceans" is used for the seaward part of the oceans from the outer limits of the exclusive economic zones, while the "coastal and near-shore areas" are defined as the landward part of the oceans from the outer limits of these zones, together with the adjacent terrestrial environment which influences or is influenced by this part of the ocean.

the sea-shores or in their immediate proximity; a variety of industries have developed on a large scale along the coast; the coastal zones are a major recreational area and the basis for expanding tourism; harbours are essential as centres for national and international transport and trade.

2.5 The global water circulation regime and the global climate are heavily influenced by the Antarctic continent and the Southern Ocean. At the same time they are, apart from the exploitation of marine mammal populations, the last frontier on the earth preserved in virtually intact conditions.

Main problems and their causes

2.6 The nature of the problems affecting the marine and coastal environment has not altered greatly in the past decades. However, the incidence and extent of human activities in the coastal areas, as well as our perception of the main threats and corresponding solutions have changed markedly on the basis of knowledge and experience accumulated over the same period. Today the environmental problems are recognized as problems stemming from population pressure combined with inadequate or improper development whose ultimate solution should be sought in resolving conflicting interests for space and resources in the framework of environmentally sound economic development.

2.7 Aside from some living resources, the open oceans seem to be still largely unaffected, but the physical and ecological degradation of coastal areas and the increase in pollution of near-shore waters from land-based sources are accelerating at an alarming pace. The often dramatic and irreversible alteration of natural coastal ecosystems and the extensive pollution of the sea are primarily caused by the rapid growth of coastal populations, the expansion of recreational areas, and the concentration of industrial development in coastal zones, accompanied by inadequate environmental, technological and economic policies. The situation in many enclosed and semi-enclosed seas is of particular concern, largely due to the physical degradation of the coastal and near-shore areas, and pollution from land-based sources or from major maritime accidents, such as the one involving the "Exxon Valdez".

2.8 The expected impact of predicted climate changes will exacerbate the present problems and may, in areas such as low-lying islands and coastal zones, significantly influence or even imperil their future development and use. The predicted climate changes will certainly affect marine living resources in many ways. Large-scale changes in total marine fisheries production are not expected, although individual stocks may suffer. Mariculture will probably be more affected. Tropical upwelling zones, which produce large amounts of fish resources, may shift polewards by hundreds of kilometres. The year to year variability of the resources they support may increase and the increased plankton productivity may reduce oxygen levels and lead to anoxic situations. The increased ultraviolet radiation related to ozone layer depletion may lead, according to some estimates, to detrimental effects on some shallow water ecosystems such as coral reefs, and may affect plankton growth.

2.9 The oceans and coastal areas are still not considered as finite economic assets which can be used on a sustainable basis only by prudent and rational exploitation. This is particularly evident when development plans and environment protection confront conventional spending priorities. Therefore relatively low priority is assigned in most national development plans to the protection of these areas and to rational use of their resources. The result is a scarcity of funds needed for measures which

could prevent, reduce or eliminate pollution of the marine environment, halt the physical degradation of coastal areas and protect their resources. In reality, such an approach leads to seriously reduced capacities for social and economic development. The poorer countries are particularly vulnerable to this vicious cycle.

2.10 The situation is particularly serious in economically disadvantaged countries burdened by depletion of natural resources, heavy indebtedness, unstable commodity prices and unfavourable trading systems. International assistance which would allow disadvantaged countries to cope with their environmental problems, often originating from the industrialized world (e.g. global climate change), is inadequate, frequently even misguided, and is not commensurate with the magnitude of the problem to be solved.

2.11 The polar regions contain some of the most fragile ecosystems. Indiscriminate exploitation of their living resources has already brought some mammal species to the brink of extinction which may have caused a serious imbalance in the natural ecosystems.

2.12 War is among the most destructive and wasteful human activities. Its direct and indirect impact on the environment, economy and human well-being are enormous and, as demonstrated by the consequences of the recent hostilities in the Gulf, can reach catastrophic dimensions, covering large geographic areas.

2.13 The capabilities of most countries, especially the developing ones, are still generally insufficient to cope adequately with the full complexity of assessing the problems facing their marine and coastal environments and the rational management of their resources. National institutional structures are generally too weak and lack the interdisciplinary expertise needed for effective action. This weakness of national structures also seriously hampers the effective participation of many countries in international efforts designed to protect and develop the marine and coastal environment.

2.14 The protection of the marine and coastal environment is reflected in the national legislation of most countries and in numerous international agreements. However, the provisions of these legislative acts are not applied efficiently to guarantee development without undermining the natural resource-base.

2.15 Public awareness about the nature, extent and implications of the problems of the marine and coastal environment needs to be considerably increased, although in some countries it already plays an important and highly visible role in mobilizing support from broad segments of the population for the necessary societal decision-making needed for the protection of this environment and a more rational utilization of its resources.

2.16 The knowledge accumulated over the past decades about the magnitude and the main causes of the problems is considerable and sufficient to indicate that the situation is serious and calls for urgent action. The technological solutions to most of these problems are also quite well known and are available, at a price. However, the present databases and understanding of the processes shaping the natural conditions of oceans and coastal areas are generally inadequate for management purposes and for reliable predictions about the trends in these conditions. Consequently, forecasts for changes that may be expected contain a relatively high degree of uncertainty.

2.17 In summary, four main factors, none of them specific to the marine and coastal environment, seem to be at the root of the present environmental problems hampering sustainable development:

(a) Inappropriate national and international economic policies and forms of development which do not take into account adequately the environmental consequences of these policies;

(b) Weak regulatory mechanisms and administrative systems dealing with environmental issues;

(c) Insufficient public awareness about the real causes and magnitude of environmental problems, and about the available remedial measures; and

(d) Inadequate forecasting of emerging environmental problems.

Remedies

2.18 *Sustaining human life and well-being requires development and a healthy environment.* Development can become difficult to achieve if natural resources are depleted or the environment degraded. Therefore, the *ultimate goal* of all strategies for the development and protection of the oceans, coastal and near-shore areas and their resources should be to ensure their *rational use.* In case of *renewable resources*, rational use must imply *indefinite sustainable use.* The use of *non-renewable resources*, obviously, cannot be sustained indefinitely, but must provide the economic basis for the build-up of activities and conditions that will ensure or contribute to a *long-term and sustainable socio-economic development*, once the non-renewable resources are exhausted. Consequently, all remedies for the present and anticipated environmental and developmental problems should be designed with that goal in mind, and their appropriateness should be judged by the degree to which they succeeded in achieving that goal.

2.19 The problems of the oceans, coastal areas and their resources are of global significance and hence their solution requires *global environmental strategies inseparable from global development strategies.*

2.20 The present problems are most evident in coastal and near-shore areas under the direct onslaught of man's activities. Although seemingly local in nature, these problems are so widespread and are so evident, even at sites far away from their origin that only globally applied strategies have a chance to achieve *long-term solutions.* However, the type and intensity of measures and policies, if they are to be effective, must be made in response to the actual situation, bearing in mind that a solution at one site should not create a nuisance elsewhere. Consequently, the most cost-effective remedies should be sought through *action on the local and national level, undertaken in the framework and as part of wider regional and global development strategies*, including the transfer of the necessary resources, technology, knowledge and skills to the disadvantaged countries.

2.21 The protection of the open oceans and of their resources obviously requires a *global approach* because uncoordinated local or unilateral national action cannot contribute significantly to the solution of the problems. The exploitable living and non-living resources of the Southern Ocean require a specially restrictive management regime.

2.22 Due to the extreme fragility of the Antarctic ecosystems, the recent decision of the parties to the Antarctic Treaty to strengthen environmental safeguards and to *prohibit the exploration and exploitation of mineral resources of the Antarctic region* for 50 years, is especially significant.

2.23 The application of *environmentally sound management practices* in coastal and maritime activities, rather than narrowly defined "conservation", is now accepted as one key to safeguarding and developing the marine and coastal environment and their resources. The unplanned or poorly planned land- and sea-use practices, the irrational exploitation of natural resources, and the pollution to which they incidentally give rise can be avoided only by these means. Management implies use: *rational use*. Emphasis on the concept of *integrated management* reflects a critical change from the earlier views of most environmentalists that the oceans had to be preserved unchanged rather than used rationally.

2.24 The seas have no physical boundaries to prevent movement of polluted waters. Therefore, global or regional strategies are needed to *control transboundary pollution from land-based sources*, including pollution reaching the marine environment through rivers and the atmosphere. The strengthening and enforcement of the 1977 Geneva Convention on the *prohibition of military or any other hostile use of environmental modification techniques* should be urgently considered by the international community.

2.25 Accidents resulting in damage to the coastal and near-shore environment, such as the pollution caused by tanker accidents, cannot be completely avoided. Nevertheless, with measures aiming at improved safety of navigation, with improved design of ships, and with the formulation and adequate implementation of *contingency and emergency plans*, the number of accidents could be reduced and their environmental impact could be considerably mitigated.

2.26 Although the effects of predicted climate changes may not be felt in the near future, in the long term their implications for the socio-economic life of coastal zones may be considerable and particularly serious for low-lying countries and small islands. *Adaptation to the changing conditions* will require a long lead-time. Therefore the full complexity of the potential problems which may be associated with predicted climate changes should be analyzed without delay and the possible *policy options and measures* which may be used as suitable responses to the expected impacts should be examined and reflected in the national *integrated coastal zone management plans*.

2.27 The policies, measures and arrangements for the protection and use of the marine and coastal environment, if they are to be rational and thus effective in the long term, should be based on an *improved understanding* of marine and coastal ecology, including ecosystem dynamics; of the relevant ocean processes; and of their interaction with terrestrial and atmospheric systems.

2.28 *Long-term systematic research and observation* programmes should be organized according to a globally coordinated strategy to *monitor the changes* in the state of the marine and coastal environment and of ocean processes, and their interaction with atmospheric and terrestrial processes. The results of the research and observations should be critically evaluated and widely disseminated through easily accessible databases.

2.29 The national institutions in charge of environmental protection in many countries are usually weak or even non-existent. Their influence on national development plans is frequently only of marginal importance. Without creating *strong national infrastructures*, equipped with interdisciplinary expertise, and without giving them access to the circles where decisions relevant to the protection of environment are made, no effective protection of coastal and marine environment could be expected.

2.30 The protection and development of seas and coastal areas require a variety of expertise, and above all a good grasp of the cross-sectoral nature of environmental protection. While narrow, sectoral technical expertise exists in most countries, greater efforts should be devoted to the *training* of experts in interdisciplinary skills.

2.31 Effective protection of the oceans can be achieved only through a high level of *intergovernmental cooperation*. It is essential, therefore, to strengthen and expand the *multilateral programmes and agreements* designed to protect the marine and coastal environment according to the specific needs of the countries concerned. *Assistance to the economically disadvantaged countries* must be part of arrangements supporting intergovernmental cooperation.

2.32 Existing *global and regional agreements*, although not universal remedies, are among the most forceful international arrangements providing the legal basis and signifying the *political commitment* for joint action. Therefore, broader adherence to the existing agreements and strict application of their provisions would contribute considerably to the protection of the marine and coastal environment. Whenever appropriate, existing agreements should be expanded or adapted to the changing needs of the countries concerned, and additional agreements should be adopted to regulate subjects not covered by existing agreements.

2.33 Although *transfer of technology, experience and data*, provision of *training*, as well as *financial assistance, preferential treatment and compensation for damage* are usually among the provisions of existing international agreements, the developing countries have benefited relatively little from such provisions. Therefore, *fostering of global solidarity* must be an essential element of all international agreements.

2.34 The widest *popular participation* in the protection of the marine and coastal environment is essential. Such participation necessitates the involvement of those who may be affected by changing environmental conditions in *decision-making debates* about development schemes which may cause such changes. It also requires broad *educational and public awareness programmes*, including introduction of environmental subjects in school curricula on all levels, as well as the provision of regular information to the general public through mass media and special publicity campaigns about the environmental and developmental issues. Such publicity campaigns should emphasize the importance of the potential *contribution from each individual* to maintain a healthy environment as a basic precondition for sustainable socio-economic development.

2.35 The lack of funds, particularly in developing countries, is the crucial and single major impediment for more forceful environmental protection action. The remedy, without which all measures and decisions will remain only at the level of declarations, is in the provision of *financial resources* additional to those currently available, enabling the disadvantaged countries to become *equal partners* in dealing with global economic and environmental issues. The financial resources required are of unprecedented magnitude, unlikely to be met from regular government

budgets. They could come from an increased flow of assistance through the mechanisms of *international agreements*, from radical expansion of the present *bilateral arrangements* between developing countries and lending/funding/donor/aid agencies and countries, or from new *multilateral funds* through which such resources would be channelled to disadvantaged countries.

2.36 However, no combination of policies, technologies and resources can significantly ameliorate the present situation unless the *non-technological roots of the problems* are resolved: population pressure on limited resources and space, competitive nationalism, the global maldistribution of wealth and opportunity, patterns of consumption, the notion that economic growth and human well-being are directly proportional and, last but not least, the illusion that supposes civilizations to be self-supporting without help from natural ecosystems. Obviously, in order to achieve this a *new attitude based on global solidarity* would be required.

3. STRATEGIES

3.1 The degradation of the marine and coastal environment is today clearly recognized as a global problem rooted in the complex political, social and economic circumstances of our planet. Consequently, the solution of the problem requires a coherent global approach and a coordinated stepwise programme of action which would deal not only with the present manifestations and direct causes of the problem, but also with its very roots. Furthermore, being a global problem it cannot be solved by individual countries without effective international cooperation, although solutions should be sought primarily through concrete national actions taken within a globally agreed framework.

Overall goal

3.2 The overall goal of the protection and development of the oceans and coastal areas is to ensure their sustainable use and development without jeopardizing their ecological integrity.

Elements and principles of general global strategy

3.3 Effective protection and development of the oceans and coastal areas require an integrated and holistic approach and a general global strategy to implement it. However, due to the number and complexity of issues involved, the general global strategy cannot cover in sufficient detail the specific aspects of each problem. Therefore, the elements and principles of the general strategy are considered in this document separately from strategies proposed as responses to specific issues, with the understanding that these elements and principles are common and applicable to all issue-specific strategies which are also global in nature.

3.4 The strategy is based on integrated coastal zone management, resting on sound scientific ground, yielding practical information required for proper management.

3.5 The following elements and principles are considered as valid for a general strategy and as relevant to the formulation, adoption and implementation of all issue-specific strategies:

Principles

(a) The need for the protection and development of the oceans and coastal areas is a global problem requiring a coherent, sequential and well-coordinated global approach;

(b) The oceans and coastal terrestrial areas, including river drainage basins, are linked in complex ecological and economic systems, and therefore their protection and development should be considered as interdependent;

(c) A set of general and of issue-specific global strategies, accompanied by concrete programmes of action, and supplemented by regional and national strategies and programmes of actions, should be applied to the protection and development of oceans and coastal areas;

(d) The strategies for the protection and development of the marine and coastal areas should be part of wider strategies ensuring sustainable social and economic development on local, national, regional and global levels;

Level of action

(e) Solutions to the problems should be sought primarily through concrete national actions, taken within a globally agreed framework;

(f) Problems common to, or specific for, a certain geographic region should be addressed through regional cooperation between the countries concerned, in order to reinforce and facilitate action on the national level, and to avoid conflicting results from action taken by individual countries;

Commitment to action

(g) The general and issue-specific strategies, as well as the global and regional programmes of action should be based on the unambiguously expressed political commitment of countries participating in such programmes, preferably in the form of legally binding international agreements;

Modality of action

(h) Each strategy should be accompanied by a concrete programme of action, indicating:

- The goals and targets to be achieved;
- The timetable envisaged for achieving the goals and targets;
- The actors to be involved and their respective responsibilities;
- The costs to be met and the sources of funding; and
- The expected benefits from the implementation of the strategy and the programme;

(i) The national, regional and global programmes of action, if they are to be viable, must be realistic, i.e. within the limits of the economic capabilities of the countries which are expected to apply them, and should be socially and politically acceptable;

(j) The relevant existing regional and global programmes and mechanisms should be strengthened and used, as far as possible, for the implementation of the strategies and programmes of action adopted for the protection and development of the oceans and coastal areas;

(k) When developing new regional or global programmes, the relevant existing programmes should be fully taken into account in order to avoid duplication of efforts and competition for the use of the available national institutional infrastructures and expertise;

(l) Programmes based on a donor/recipient relationship between developed and developing countries should be carried out by taking into account the recipient countries' real needs, priorities and capabilities to absorb, maintain and operate the results of aid projects;

(m) Action should not lead to an uncritical transfer of problems from the marine and coastal environment to other sectors of the biosphere;

Support to action

(n) International intellectual and technical assistance should be made available to developing countries and countries with economies in transition, in order to improve their capabilities for environmentally sound development and to facilitate their full participation in the implementation of the adopted strategies and programmes of action;

(o) Financial resources, additional to those presently available, should be provided to developing countries and countries with economies in transition, and their access to cleaner technologies under favourable financial terms should be ensured;

(p) Special financial assistance should be made available to countries which may be affected by problems largely created by activities beyond their control (e.g. impact of expected climate change);

(q) Free exchange of data, information and experience, as well as intensive training activities relevant to the implementation of the strategies and programmes of action should be organized at all levels in a systematic and well-coordinated way, using existing mechanisms for information sharing and training as far as possible;

Coordination of action

(r) The implementation of adopted strategies and programmes of action should be coordinated and supervised on national levels by national institutions with appropriate authority, adequate technical capability and sufficient financial resources;

(s) The adopted regional or global strategies and programmes of action should envisage institutional mechanisms and financial support to facilitate and ensure the coordination and implementation of the strategies and corresponding programmes, compliance with their provisions and monitoring of their effectiveness.

Issue-specific global strategies

3.6 The general outline of possible issue-specific global strategies is presented in the ensuing paragraphs. Each of these outlines would have to be elaborated in greater detail to meet the requirements indicated in paragraph 3.5(h). For an example of an elaborated issue-specific strategy the reader is referred to document UNEP(OCA)/WG.14/3.[2]

3.7 The issue-specific strategies should not be considered in isolation from each other, but as integral parts of a general strategy, because the subjects they are treating are only in very rare cases independent from subjects treated in several other issue-specific strategies. In developing programmes of action for strategies dealing with control of pollution, management of resources, biological diversity, emerging environmental issues and response to environmental emergencies, the strategies covering cross-sectorial issues (i.e. improved coastal zone management; research; education and public awareness; strengthening of national institutions; non-governmental organizations; business and trade communities, financial institutions; international cooperation) should be taken fully into account.

Control of pollution from land-based sources[3]

3.8 *Problem*: Aside from physical and ecological degradation of the coastal and near-shore zones, pollution from land-based sources is at present the single most important threat to the marine environment and impediment to the use and sustainable development of the oceans and coastal areas, and their resources. Land-based sources contribute about 77 per cent to the pollution load of the oceans.

3.9 *Goal*: Adoption of a global plan to address marine pollution from land-based sources, including the identification of actors, costs and sources of funding.

3.10 *Target*: Global reduction by the year 2000 of pollution from land-based sources to 1990 levels, with a programme of continuing reduction in succeeding years.

3.11 *Costs and benefits*: Solutions to the problem may be costly (several hundreds of billions of US dollars) but the benefits derived and the value of damage and resources at risk (including health, fisheries, tourism, etc.) in many cases far outstrip these costs.[4]

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[2] Strategy for the reduction of the degradation of the marine environment from land-based sources of pollution and activities in coastal areas.

[3] See footnote 2.

[4] See documents UNEP(OCA)/WG.14/3, UNEP(OCA)/WG.14/Inf.8 and UNEP(OCA)/WG.14/Inf.9 analysing the costs and benefits of measures for the reduction of the degradation of the environment from land-based sources of pollution and activities in coastal areas.

3.12 *Strategy*:

(a) Formulation of a costed and targeted global programme of action, with a timetable for its implementation, within a frame of reference of globally applicable principles, approaches and measures;

(b) Global political commitment, on the highest political level, to the agreed elements of the global strategy and programme of action, together with their underlying principles, approaches and measures;

(c) Early implementation of the global programme of action through well-designed concrete national action plans, as well as through existing and new regional agreements and programmes of action;

(d) Making available additional financial resources and facilitating access to cleaner technology by developing countries and countries with economies in transition;

(e) Preparation of a global inventory of land-based sources of pollution and databases on their effects through well-coordinated regional, sub-regional and national efforts;

(f) Assessment of the ecological, social and economic significance and impact of these sources and determination of national, subregional, regional and global problems and priorities in controlling the sources;

(g) Establishment of an international fund for the application of appropriate sewage treatment technologies;

(h) Establishment of a clearing-house on marine pollution control information; and

(i) Establishment of adequate institutional mechanisms and financial support to ensure the global coordination and monitoring of the implementation of the agreed programme of action, including its underlying principles, approaches and measures.

Control of pollution from dumping

3.13 *Problem*: Dumping of waste from ships and aircraft contributes about 10 per cent of the pollution load of the oceans. It poses a problem for benthic marine ecosystems, and may affect some commercially exploitable living resources. Certain types of waste dumped into the oceans may have a considerable long-term environmental impact.

3.14 *Goal*: Progressive reduction of harmful waste dumped into oceans. Elimination of waste which, due to its nature (e.g. radioactive waste, waste with low degradation rate), may pose a long-term threat to the quality of marine environment.

3.15 *Strategy*:

(a) Broader adherence to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter and regional agreements on the same topic; and

(b) Stricter application of the provisions of existing global and regional agreements on control of dumping.

Improved coastal zone management

3.16 *Problem*: Inadequate coastal zone planning, development and management contribute to the physical degradation of the coast, to destruction of the integrity of coastal and near-shore ecosystems and imperil the sustainable exploitation of their resources and amenities. Most of the problems associated with pollutants from land-based sources are the consequence of inadequate coastal zone management and inappropriate land-use practices in drainage basins.

Goal: Wide application of integrated management of coastal zones and river basins, based on sound planning and responsible policies for management of the environment and its resources.

3.17 *Strategy*:

(a) Wide application of environmental criteria in land- and sea-use zoning of coastal development; and

(b) Mandatory assessment (environmental impact assessment) of the likely environmental impact, related social and economic costs and benefits, and long-term effects of all planned activities and projects which may affect the quality of the environment.

3.18 The strategy would benefit from:

(a) Changes in the present patterns of national economic and social development (e.g. tourism, concentration of industries in coastal zones, demographic pressures on the coastline), taking into account viable alternatives;

(b) Development and application of economic and fiscal policies and measures stimulating environmentally sound coastal zone developments; and

(c) Restrictions on coastal activities and development which may directly or indirectly affect the quality of the marine environment, its resources, and amenities.

Sustained management of living resources[5]

3.19 *Problem*: The current rate of fisheries harvest is close to the estimated maximum sustainable yield, with about 95 per cent of the world marine catch (close to 80 million tons per year) coming from near-shore waters. A number of important fisheries resources, including some marine mammals, are generally over-exploited. Ecosystems such as mangroves, wetlands, coral reefs and seagrass-beds are imperilled in many parts of the world by ill-conceived developmental schemes, over-exploitation, pollution, siltation and land-reclamation. The enforcement of measures for environmentally sound management of living resources is inadequate.

3.20 *Goal*: Protection of living resources from over-exploitation. Maintenance of the integrity of coastal and marine ecosystems.

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5 This strategy should be closely coordinated with the strategy for the protection of biological diversity.

3.21 *Strategy*:

(a) Integration of living resource management plans into larger-scale integrated coastal zone management plans;

(b) Protection of the integrity of ecosystems by removing the factors impinging on that integrity;

(c) Expansion of the exploitation of unconventional fisheries resources;

(d) Environmentally sound management of existing and expanding aquaculture;

(e) Protection of artisanal fisheries and the access of indigenous people to the living resources exploited by them traditionally;

(f) Application of environmentally sound administrative and legal measures, and technologies, for the exploitation of living resources on a sustainable level, including:

- Measures for reduction of incidental capture of non-target species, including marine mammals, turtles and birds;

- Restriction on large-scale pelagic driftnet fishing in areas where it may deplete the stocks of living marine resources; and

- Limitations on the access to endangered stocks;

(g) Adoption of economic measures and fiscal policies stimulating the protection and rational exploitation of living resources; and

(h) Regional and global collaboration on all issues relevant to the management of living resources shared between several countries.

Maintaining biological diversity[6]

3.22 *Problem*: The marine environment is, in general, resilient to the loss of biological diversity, but some heavily exploited or stressed near-shore and coastal ecosystems (coral reefs, lagoons, mangroves, wetlands, estuaries) and certain large marine mammals are clearly threatened.

3.23 *Goal*: Maintaining the integrity and biological diversity of coastal and marine ecosystems.

3.24 *Strategy*:

(a) Protection of habitats and ecosystems critical for the maintenance of biodiversity and survival of endangered species, taking into account the viable alternatives;

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[6] The strategy should be part of a broader global strategy on protection of biodiversity and should be considered in conjunction with the strategy for the management of living resources and management of coastal zones appearing in this document.

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(b) Restriction on the commercial exploitation of species considered endangered, such as some marine mammals;

(c) Stricter control on the trade in endangered species;

(d) Stricter control on the genetic manipulation of species which may be exploited in mariculture;

(e) Stricter control on the deliberate and accidental introduction of alien species which may impoverish biodiversity; and

(f) Broader adherence to the global and regional agreements protecting biodiversity and stricter adherence to their provisions.

Rational exploitation of non-living resources[7]

3.25 *Problem*: Careless exploration and exploitation of mineral resources may lead to habitat destruction and pollution.

3.26 *Goal*: Exploitation of mineral resources without environmental damage and keeping in mind the long-term economic interest of the countries exploiting them.

3.27 *Strategy*:

(a) Application of measures and technologies in the exploration, extraction, processing and transportation of mineral resources which do not cause environmental damage;

(b) Mandatory decommissioning of installations which stopped being used in exploration and exploitation of sea-bed, and their disposal without damage to the environment;

(c) Supplementing the general provisions of the United Nations Convention on the Law of the Sea dealing with the protection of the marine environment from pollution arising from the exploration and exploitation of the sea-bed by more specific regional agreements safeguarding the environment from such pollution;

(d) Identification of additional geographic regions and locations where non-living resources could be exploited; and

(e) The exploitation of non-renewable mineral resources should be used to provide the economic basis for build-up of activities and conditions which will ensure or contribute to a long-term and sustainable socio-economic development, once the resource is exhausted;[8]

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[7] Most of the mineral resources cannot be considered as renewable on the time-scale on which their exploitation is taking place.

[8] This applies to mineral resources exploited under national jurisdiction. The exploitation of the mineral resources outside of national jurisdiction is governed by the provisions of the United Nations Convention on the Law of the Sea.

Emerging global environmental issues[9]

3.28 *Problem*: In the long term, the impact of predicted climate changes, especially the various direct and indirect effects of the expected sea level rise (65 ± 35 cm by the end of the next century) and the increased frequency and severity of episodic events (e.g. tropical storms) may prove to be among the major social, developmental and environmental problems facing the low-lying coastal areas and islands.

3.29 *Goal*: Preparedness for taking suitable measures needed to prevent or adapt to the expected impact of climate changes.

3.30 *Strategy:*[10]

(a) Identification of particularly vulnerable resources, developmental activities, species, ecosystems and geographic areas;

(b) Preparation of detailed assessments of the potential site-specific impacts on ecological systems and socio-economic activities;

(c) Consideration of options for response policies and measures which may mitigate or eliminate the negative effects of the impact;

(d) Development and timely implementation of the most suitable response policies and measures in the framework of national integrated coastal zone management plans; and

(e) Reduction of activities which may provoke or accelerate climate changes.

Management of open oceans[11]

3.31 *Problem*: The management of the resources of the open oceans, including those found in or on the underlying sea-bed and ocean floor, is envisaged to be regulated by the general provisions of the United Nations Convention on the Law of the Sea.

3.32 *Goal*: Environmentally sound management of the resources of the open oceans.

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[9] The proposed strategy deals only with expected climate changes, although additional major problems may be identified in the future.

[10] The strategy should be part of a broader strategy developed within the framework of the Intergovernmental Panel on Climate Change. It should also be taken into account in the implementation of all other issue-specific strategies described in this document.

[11] The specific aspects of this strategy are covered by a number of other strategies suggested in this document, notably those for control of pollution from dumping, sustained management of living resources, protection of biological diversity, rational exploitation of mineral resources, response to environmental emergencies, research and monitoring/observations.

3.33 *Strategy*:

(a) Broader adherence to and implementation of international ocean treaties, including the United Nations Convention on the Law of the Sea.

Response to environmental emergencies

3.34 *Problem*: Maritime accidents, such as ship collisions or oil well blow-outs, are the most common environmental emergencies affecting the oceans and coastal areas. As revealed by the recent incident involving the "Exxon Valdez", accidents, even when they occur in the most developed countries, lead to massive local environmental damage.

3.35 *Goal*: Reduction of the number and severity of maritime accidents, and improved response capabilities.

3.36 *Strategy*:

(a) Assessment of resources, economic activities, species, ecosystems and geographic areas at special risk in case of environmental emergencies;

(b) Formulation and adoption of national, subregional and regional contingency plans for environmental emergencies;

(c) Development of national and regional response capabilities (institutions, expertise, manpower, material, equipment and financial resources);

(d) Improved safety of navigation and activities related to the exploration and exploitation of mineral resources; and

(e) Broader adherence to existing and adoption of additional bilateral and multilateral agreements for cooperation and assistance in cases of emergency, including schemes for determining liability and providing compensation in case of transboundary damage.

Research[12]

3.37 *Problem*: The existing vast number of unknowns and uncertainties in the natural, technical, social and political sciences hamper a more effective application of science to the protection and development of the oceans and coastal areas.

3.38 *Goal*: Improved understanding of the environmental, technical and societal roots of the present day obstacles for sustainable development and improved forecasts for changes which may occur in the future.

3.39 *Strategy*: Intensified target-oriented research and studies on:

(a) Factors and processes determining and influencing the response of living resources to exploitation;

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[12] Most of the topics treated in this strategy are in direct support of activities envisaged by other strategies described in this document.

(b) Restoration of damaged coastal ecosystems and depleted fisheries stocks;

(c) Tolerance of some ecosystems (e.g. mangroves, coral reefs) to the expected rate and magnitude of sea-level and temperature elevations;

(d) Scientific rationale for environmental quality criteria;

(e) Biogeochemical fluxes of contaminants entering the marine environment from all sources, including those entering through rivers and atmosphere;

(f) Effects of contaminants (including nutrients) on marine organisms with emphasis on in-situ studies of the cumulative effects of long-term low-level exposures of ecosystem to a variety of contaminants;

(g) Processes leading to eutrophication and excessive algal blooms;

(h) Toxicity and other biological effects of new substances being introduced into the marine environment;

(i) Role of the oceans in the climate system;

(j) Impact of ozone layer depletion on primary productivity of the oceans, and on intertidal and coastal ecosystems, including coastal agriculture and silviculture;

(k) Less wasteful production technologies, i.e. technologies with high energy efficiency and a low amount of waste;

(l) Improvement of existing and development of new technologies for treatment and reuse of industrial and domestic wastes;

(m) Potential use of oceans as a source of renewable energy (e.g. waves and tides, thermal and salinity gradients) and its environmental implications;

(n) Methodologies related to planning and managing sustainable development, such as:

- Environmental impact assessment with good predictive capabilities;
- Environmental accounting;
- Cost-benefit analysis of environmental protection measures;
- Comparative analysis of alternative development options;
- Limited access regimes in fisheries;
- Management techniques for coastal areas, such as zoning of uses and different type of use or protection regulations;
- Risk assessment and management;

(o) Effectiveness of economic measures, and in particular fiscal incentives, which are or may be used in controlling environmental degradation or contribute to the restoration of damaged systems;

(p) Effective use of media and publicity campaigns in promoting public awareness about the advantages and need for sustainable development; and

(q) Societal response to short-term disadvantages of measures taken to ensure environment protection and sustainable development in the interest of long-term benefits, and how to overcome the eventual negative responses.

Observations, monitoring and forecasting

3.40 *Problem*: The information and data collected through the present monitoring and observation systems are insufficient to meet all the demands posed by the protection and development of the oceans and coastal areas, and rational management of their resources. The available information is particularly inadequate in providing clarification and answers to the questions raised in connection with forecasting environmental degradation and impact of climate change.

3.41 *Goal*: Improved understanding of the dynamics (rate, direction, interdependence) of changes in the natural environment and socio-economic development, long-term monitoring, and operational forecasting.

3.42 *Strategy*:

(a) Reorientation, as far as applicable and feasible, of existing monitoring and observation programmes toward subjects of direct relevance to the protection and development of oceans and coastal areas;

(b) Initiation of the planned Global Ocean Observing System as a multi-purpose long-term observation system designed to provide effectively and on a routine basis information needed for climate prediction and management of the oceans and coastal areas;

(c) Monitoring of effects attributable to climate changes (e.g. sea-level rise, changes in ocean circulation patterns and their impact on fisheries);

(d) Monitoring of natural long-term dynamics of fisheries resources and associated ecosystems;

(e) Monitoring of the dynamics of coastal development (e.g. population, industry, tourism) and its environmental impact;

(f) Improved data management (reporting, quality control, analysis, synthesis, dissemination);

(g) Use of data and information resulting from monitoring and observation systems, as well as from research, in developing scenarios and predictive models; and

(h) Improved coordination and interaction between the existing monitoring/observation systems and those that may be launched in the future.

Education and public awareness

3.43 *Problem*: There is a lack of adequate public understanding of the short- and long-term benefits and disadvantages of economic, including fiscal, and environment protection measures. This lack seriously weakens the societal decision-making process needed for the sustainable development of the oceans and coastal areas.

3.44 *Goal*: Improved understanding of the linkages between development and environmental protection by the general public.

3.45 *Costs and benefits*: The investment in education and public awareness building is relatively small when compared with investment in development, and is the most cost-effective contribution to sustainable development.

3.46 *Strategy*:

(a) Addressing to parents systematic educational programmes suitable for transfer of environmental awareness to their families, and to children in particular;

(b) Raising the interest of the general public in environmental and developmental matters by involvement in the planning and decision-making process;

(c) Introducing materials on developmental issues and associated environmental problems into school curricula on all levels of formal education;

(d) Intensive and more frequent use of all standard channels of communication with the public at large (i.e. newspapers, radio, television) for transmission of information on the inseparable link between the socio-economic development and protection of the environment; and

(e) Organization of special publicity campaigns to inform the public about major developmental projects and their environmental, economic and social implications.

Strengthening national institutions

3.47 *Problem*: The capacity of many countries to ensure sustainable development is seriously hampered by weaknesses in national institutions and mechanisms which prevent them dealing adequately with the cross-sectorial issues pertaining to environmentally sound development.

3.48 *Goal*: Development of strong national institutions and structures for the coordination and implementation of national developmental and environmental policies.

3.49 *Strategy*:

(a) Establishment of stronger links between national institutions and structures responsible for the formulation, coordination and implementation of national social, economic and developmental strategies and environmental policies;

(b) Replacement of the sectoral approach to developmental issues by an inter-sectoral approach in which environmental considerations play a significant role; and

(c) Building up of expertise in interdisciplinary subjects (e.g. environmental economics) by intensive training activities and by transfer of experience and "know-how" through international cooperation and assistance.

Non-governmental organizations

3.50 *Problem*: The concern of citizens about environmental and developmental issues is frequently expressed through non-governmental pressure groups which are too often treated by Governments, business, financial and trade communities as certain adversaries rather than potential allies.

3.51 *Goal*: Strengthening of the societal decision-making process by involvement of non-governmental pressure groups.

3.52 *Costs and benefits*: No costs to Governments, but considerable benefits in terms of easier acceptance and implementation of environmentally sound developmental policies.

3.53 *Strategy*:

(a) Broader involvement of non-governmental pressure groups in the decision-making process through consultations between them and the relevant government structures on major issues related to environment and development;

(b) More freedom and opportunity for non-governmental organizations to express their views in international fora; and

(c) Encouragement of non-governmental organizations to participate in the implementation, or to facilitate the implementation of national and international programmes contributing to environmentally sound and sustainable development.

Business and trade communities, financial institutions

3.54 *Problem*: The business and trade communities, and financial institutions, in both the public and private sector, are primarily interested in development activities which frequently do not take sufficiently into account either the environmental consequences or the long-term economic costs and benefits from these activities for society as a whole.

3.55 *Goal*: Full participation of the business and trade communities, and financial institutions in the protection of the oceans and coastal areas through environmentally sound development.

3.56 *Strategy*:

(a) Increased public sector investments in environmentally sound developmental projects and environment protection measures, such as application of clean technologies;

(b) Stronger partnership between the public and private sectors, particularly in fields where the private sector does not have enough economic incentives to provide funds for research, development and initial capital investment;

(c) Wider application of economic and fiscal measures (e.g. subsidies, tax incentives) linked with environmental accounting, and lending policies stimulating environmentally sound developmental activities;

(d) Taking into account national security considerations in their broadest sense, e.g. the advantages offered by the conservation of non-renewable resources and exploitation of renewable resources on a sustainable basis, by reduction of imports if they can be economically replaced by domestic products, etc.; and

(e) Involvement of the private sector in the formulation of national economic and environmental goals and policies, particularly in countries where the private sector operates relatively free from the administrative control of the Government.

International cooperation and coordination through the United Nations system[13]

3.57 *Problem*: The present level of international cooperation in the protection and management of oceans and coastal areas, and the coordination of this cooperation through the United Nations system is too fragmented, sectoral, and therefore inadequate to safeguard the ecological integrity of the oceans and coastal areas and ensure their sustainable use and development.

3.58 *Goal*: Fostering and facilitating processes leading to the development of the oceans and coastal areas as an integrated social and natural system on the basis of international consensus and solidarity.

3.59 *Strategy*:

(a) Redefinition of the mandates and roles of various United Nations bodies presently dealing with the issues of development and environment, including organizational and structural changes which may be needed to fulfil efficiently the redefined mandates and roles; and

(b) Improved cooperation and coordination between United Nations bodies dealing with environmental and developmental subjects in order to eliminate the unnecessary and wasteful duplication and counterproductive competition in their work.

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[13] The strategy deals only with international cooperation in the protection and development of the oceans and coastal areas as far as it concerns the United Nations system. Obviously, the strategy may be relevant to other subject areas of concern to the United Nations system and should be seen in much wider context of international cooperation which does not involve only the United Nations system.

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ITEM 7:* PROGRAMME MATTERS, INCLUDING THE IMPLEMENTATION OF THE PLAN OF ACTION TO COMBAT DESERTIFICATION

CONTRIBUTION OF THE UNITED NATIONS ENVIRONMENT PROGRAMME TO INTERNATIONAL COOPERATION TO ADDRESS AND MITIGATE THE CONSEQUENCES OF THE ACCIDENT AT THE CHERNOBYL NUCLEAR POWER PLANT

Report of the Executive Director

Note by the Secretariat

The present brief report on UNEP's continued active participation in the international cooperation to address and mitigate the consequences of the accident at the Chernobyl nuclear power plant is submitted to the Governing Council for information as requested in its decision 16/10.

1. Efforts to address and mitigate the consequences of the Chernobyl accident are proceeding at the international and national levels with the full support and cooperation of UNEP. The United Nations Secretariat for Chernobyl is coordinating the various projects, which necessarily must cover a broad spectrum of needs in terms of human health and settlements, social welfare, agriculture, industry and environment. The Inter-Agency Task Force, established in April 1991, has met several times, with UNEP participation, to inform, assist and coordinate the international projects. A Joint Plan covering 131 project proposals was formulated and presented at the Pledging Conference, held at United Nations Headquarters, New York, in September 1991. While only limited support could be secured at the time of the conference, negotiations with potential donors are continuing through the Chernobyl Secretariat.

2. It is recognized that the political changes in the former USSR are complicating the assistance efforts, and the underlying economic uncertainties are restraining the wider or deeper involvement of international agencies. However, every effort is being made by authorities in Belarus, Russian Federation and Ukraine to cooperate and facilitate the assistance programmes. Demand for the limited funds is great, and competing schemes have been proposed by the various institutes in the region. There must be a careful review to identify the most immediate needs.

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* Refers to the number of the item on the Provisional Agenda (UNEP/GC.17/1).

3. UNEP primarily supports and intends to remain involved in projects in the fields of human health, environmental studies and public information. Some of those activities have commenced; others are in the planning stage.

4. The International Programme on the Health Effects of the Chernobyl Accident (IPHECA) was established to study the long-term incidence of diseases that may have been caused by exposure to radiation during the accident. The epidemiological studies are of a long-term nature and incorporate aspects of early detection and treatment of leukaemia, thyroid cancer and other diseases. Initial support for the project has been provided by the Government of Japan. UNEP will work closely with the World Health Organization (WHO) to provide technical expertise on the environmental aspects of the work under the project.

5. Efforts to control the spread of environmental contamination from the accident have been largely successful. Changes in agricultural practices and the continued monitoring of foods ensure that the exposure of residents outside the 30 km exclusion zone lies within acceptable international standards. UNEP was represented on the Advisory Committee that conducted the International Chernobyl Project: Assessment of Radiological Consequences and Evaluation of Protective Measures. In 1991, the International Atomic Energy Agency (IAEA) issued the report prepared on the conclusion of the project. UNEP continues to participate in the follow-up to the project through attending meetings of the Inter-Agency Committee on Response to Nuclear Accidents. In this way UNEP is able to report on its activities to other agencies, such as the WHO/UNEP Global Environmental Radiation Monitoring Network (GERMON), and ensure an adequate data flow to other agencies.

6. The numerous measurements of radiation levels in the environment surrounding Chernobyl provide the basis for many evaluations and scientific studies. UNEP will be supporting specific studies to establish a radiation database as part of the Global Environment Monitoring System (GEMS), to carry out data management projects within the Global Resource Information Database (GRID), and to establish datasets for model development and validation.

7. In addition to scientific work, public information on the consequences of the Chernobyl accident is also needed. In 1991 UNEP sponsored the publication of the booklet "Radiation - Doses, Effects, Risks", which makes the assessments of the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) available to a wide general audience. A publication about Chernobyl will be issued in 1993 by UNEP in the GEMS Environment Library series, and will contribute further to general information on the effects of radiation and nuclear accidents. Such information will help to put the risks from radiation in perspective and give some reassurance to those individuals most directly affected by the accident.

8. UNEP sees a broad, continuing role in supporting efforts to mitigate the consequences of the Chernobyl accident. Its most effective role will be to increase recognition of the problems and to support the coordinated study and solution of the issues. The establishment of the joint United Nations/United Nations Development Programme (UNDP) offices in Minsk and Kiev will facilitate the implementation of projects in the affected regions by allowing technical experts, including those from UNEP, to coordinate their activities better.

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ITEM 7*: PROGRAMME MATTERS, INCLUDING THE IMPLEMENTATION OF THE PLAN OF ACTION TO COMBAT DESERTIFICATION

PROGRESS OF WORK UNDER THE NEW PROGRAMME ACTIVITY CENTRES

Report of the Executive Director

Note by the Secretariat

The present report describes the progress of work under the three new Programme Activity Centres (PACs) established in accordance with Governing Council decision 16/25 of 31 May 1991, namely Environmental Law and Institutions PAC (ELI/PAC), Global Resource Information Database PAC (GRID/PAC) and Industry and Environment PAC (IE/PAC).

A. *Environmental Law and Institutions Programme Activity Centre (ELI/PAC)*

1. With a view to enhancing UNEP's activities in the development of environmental law and the strengthening of relevant institutional structures, the Environmental Law and Institutions Unit was upgraded to the Environmental Law and Institutions Programme Activity Centre (ELI/PAC) on 1 January 1992, pursuant to Governing Council decision 16/25 of 31 May 1991. The priorities and long-term goals of ELI/PAC were laid down in the annex to the decision covering the following three programme areas: promotion and implementation of global legal instruments; formulation and implementation of national environmental legislation and establishment or support of appropriate institutions; and legal education, training and information exchange.

2. ELI/PAC is divided into three units, namely International Legal Instruments; National Legislation and Institutions; and Legal Education, Training and Information, in line with the three programme areas mentioned above. The composition of staff within ELI/PAC in the Professional category and above as of 30 November 1992 is as follows:

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* Refers to the number of the item on the Provisional Agenda (UNEP/GC.17/1).

Director D-2, Deputy Director D-1 (vacant), Administrative Officer P-3		
International Legal Instruments 1 P-5, 1 P-4 (vacant) 3 P-3s (1 vacant)	National Legislation and Institutions 1 P-4/5, 3 P-3 (3 vacant)	Legal Education Training and Information 1 P-4/5 1 P-3 (vacant)

3. Of the 14 established posts in the Professional and higher categories, 7 had been filled as of 30 November 1992 and the remaining seven posts were expected to be filled in 1993. Eleven established posts for General Service staff, among which eight had been filled as of 30 November 1992, are also expected to be filled in 1993.

International legal instruments

4. Since its upgrading from a unit to a Programme Activity Centre, ELI/PAC has been more active in the development and implementation of international legal instruments. In the programme area of biological diversity, the Intergovernmental Negotiating Committee (INC) for a Convention on Biological Diversity held the sixth negotiating session/fourth session in Nairobi in February 1992 and the final negotiating session in Nairobi in May 1992. The agreed text of the Convention on Biological Diversity was adopted by a conference of high-level government officials in Nairobi on 22 May 1992. The Convention was opened for signature in Rio de Janeiro on 5 June 1992, during the United Nations Conference on Environment and Development (UNCED). In the course of the negotiation process for the conclusion of the Convention, ELI/PAC had been playing an important role, including the organization of a series of meetings and the preparation of documentation for the meetings. ELI/PAC has been taking action to follow up on the Convention on Biological Diversity, including the establishment of an interim secretariat for the Convention and the implementation of resolutions of the Nairobi Final Act.

5. In the programme area of climate change, in accordance with Governing Council decision 16/41, Section II, paragraph 2, an ELI/PAC staff member was seconded to the secretariat for the Intergovernmental Negotiating Committee for a Framework Convention on Climate Change throughout the negotiation process of the Convention. The United Nations Framework Convention on Climate Change was adopted at New York on 9 May 1992 and opened for signature at Rio de Janeiro, during UNCED. In line with General Assembly resolution 47/195 of 22 December 1992, ELI/PAC will maintain its active involvement in the follow-up activities of the Intergovernmental Negotiating Committee and the implementation of the Convention.

6. For the effective implementation of the amended London Guidelines for the Exchange of Information on Chemicals in International Trade, ELI/PAC, in close cooperation with the International Register of Potentially Toxic Chemicals (IRPTC)/PAC, has been taking action in the field of toxic chemicals management, including the development of legislative guidance on the management of chemicals and the preparation of a Code of Ethics on the International Trade in Chemicals. The third session of the Ad Hoc Working Group of Experts on the Implementation of the Amended London Guidelines, organized by ELI/PAC and IRPTC/PAC and scheduled for January 1993, will consider modalities to strengthen the legal basis of the amended London Guidelines.

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7. For 1993 and onwards, ELI/PAC's activities, on the basis of existing mandates, will include the implementation of the Convention on Biological Diversity as well as preparatory work for the formulation and implementation, as appropriate, of international legal instruments, in particular on marine pollution from land-based sources; exchange of information on chemicals in international trade; desertification; international cooperation in environmental emergencies; and environmental impact assessment. Most of these programme areas have been identified for action in Agenda 21, as well as in the Montevideo Programme for the Development and Periodic Review of Environmental Law for the present decade.

8. Agenda 21, Chapter 38, paragraph 22, includes among the priority areas for UNEP the further development of international environmental law, in particular conventions and guidelines, and the promotion of their implementation. ELI/PAC's activities should be strengthened to further develop and implement international legal instruments in the field of the environment, in particular through the implementation of the Montevideo Programme for the present decade.

9. Also in its chapter 38, paragraph 22, Agenda 21 lists as one of the priority areas for UNEP the coordinating functions arising from an increasing number of international legal agreements, *inter alia*, the functioning of the secretariats of the conventions. ELI/PAC will continue to take action in this regard, particularly for the coordination of secretariats of conventions developed under the auspices of UNEP.

National legislation and institutions

10. ELI/PAC has been providing technical assistance to developing countries in order to develop national environmental legislation and institutions. Such technical assistance includes activities to assess countries' needs and problems; identify the status of existing legislation and institutional arrangements and assess their adequacy; and assist in the development of environmental policy, legislation and related institutions, according to the specific needs identified. In 1992, ELI/PAC provided such technical assistance to Benin; Burkina Faso; Burundi; Central African Republic; Gambia; Guyana; Mongolia; Namibia; Rwanda; Sao Tome and Principe; and Trinidad and Tobago. For 1993, ELI/PAC plans to provide further technical assistance to more than ten developing countries, on the basis of requests by the Governments concerned.

Legal education, training and information

11. Information on environmental law and institutions has been compiled, published and disseminated to Governments, organizations and the public. The updated version of the *Register of International Treaties and Other Agreements in the Field of the Environment* will be issued in 1993. The *Directory of Principal Governmental Bodies Dealing with the Environment* will be updated and published in 1993. *Selected Multilateral Treaties in the Field of the Environment*, covering conventions and protocols concluded between the late 1970s and the late 1980s was made available in early 1992.

12. With respect to legal education and training, UNEP and the United Nations University (UNU) plan to hold a Global Training Programme in Environmental Law in The Hague in the middle of 1993. Upon request, information on environmental law in general and, specifically, on the work of UNEP in this field has been disseminated widely, on a day-to-day basis, to students and researchers at universities and higher research institutions.

13. A national training programme in environmental law and institutions was held in Lesotho in January 1992 and was attended by government officials and representatives of non-governmental organizations and academic circles. A Regional Workshop on Environmental Law for Countries in the South Pacific Region was held in Apia, Western Samoa, in November 1992, organized jointly by UNEP and the South Pacific Regional Environment Programme. For 1993, a regional training programme for West Asian countries and two national training programmes are planned, one in Asia and the other for Southern African countries.

14. For 1993, ELI/PAC plans to provide for the attachment of senior legal officers from developing countries to its offices for periods of one to three months. In this way the attached officers will gain experience of the legal and institutional aspects of current environmental problems as well as of UNEP activities, in particular in the field of environmental law and institutions.

15. In order to increase the awareness of government officials and the public, ELI/PAC will continue to compile information on environmental law and institutions and to disseminate such information upon request. The establishment of a database of national and international environmental law has been included in ELI/PAC's programme for action for the near future, in order to disseminate such information more widely and promptly. Concerning the establishment of such a database, Chapter 8, paragraph 19 of Agenda 21 on the provision of legal reference and support services has been taken into account.

16. With a view to enhancing the developing countries' capacities and capabilities for sustainable development through the development of national legislation and institutions and ensuring that countries comply with the provisions of international legal instruments, ELI/PAC will strengthen its activities in legal education and training for 1993 and beyond. Such activities are set out in Agenda 21, Chapter 8, paragraph 20, concerning the establishment of a cooperative training network for sustainable development law. ELI/PAC's activities will also include assistance in building up expertise in international law, particularly in relation to sustainable development, and, as envisaged in Agenda 21, Chapter 39, paragraph 8, in assuring access to the necessary reference information and expertise.

B. *Global Resource Information Database Programme Activity Centre (GRID/PAC)*

17. The overall mission of GRID has remained, namely, to provide timely and reliable georeferenced information and access to a unique international Geographic Information Service (GIS) for addressing environmental issues at global, regional and national levels, in order to bridge the gap between scientific understanding of earth processes and sound management of the environment.

18. Four long-term goals for GRID have been articulated:

(a) Environmental management support: a fully integrated and functioning United Nations-based core GRID system of cooperating agencies and national centres, openly exchanging environmental data and information;

(b) Environmental data management: all major existing global and regional environmental databases to be available through the GRID network;

(c) Agency support: all United Nations specialized agencies and most major intergovernmental organizations to have access to GRID data and technology;

(d) Technology transfer: provision of access to GRID data technology to all countries in the world, providing most countries with functioning GRID-compatible monitoring and assessment centres.

19. The general structural concept of GRID remains unchanged, that is, a distributed system with cooperating centres around the world. The specific notion of co-locating GRID centres with UNEP regional offices has been met only in part, due to budget restrictions and the evolving role of UNEP in the regions. GRID-Geneva covers Europe; GRID-Nairobi, Africa; GRID-Bangkok, South-East Asia; GRID-Sioux Falls, North America. There is an advanced plan for a regional strategy in the Latin American and Caribbean region (under the general rubric of support to development of environmental information systems within Earthwatch). Fact-finding and needs surveys for the West Asia region are at an advanced stage of development.

20. In keeping with the long-term goals stated in paragraphs 18 (a), (b), (d) above, UNEP has encouraged the emergence of a number of "GRID Cooperating Centres". These Centres subscribe to the basic GRID *modus operandi*, have specific areas of competence or responsibility within the GRID network in terms of region or data realms, and are financed largely from sources external to the UNEP Fund. Each Centre has a board of directors or senior advisory group on which GRID/PAC is represented, either directly or by delegation.

21. The total staff complement of the GRID/PAC project is 14 Professionals (not counting a fund management officer shared with GEMS/PAC) and 14 General Service (three of whom are highly skilled digitizing technicians). GRID-Geneva and GRID-Nairobi are wholly UNEP staffed (with the exception of secondments and visiting scientists). The GRID/PAC Deputy Director's position is currently unfilled. GRID-Sioux Falls and GRID-Bangkok each have one UNEP Programme Officer functioning as Facility Managers and for liaison with GRID/PAC.

22. Each GRID Centre also has additional Professional staff, ranging from one or two secondments in the case of GRID-Geneva and GRID-Nairobi, to a total staff commitment of 8 and 13 Professionals in the cases of GRID-Arendal and GRID-Tsukuba, respectively. In round terms, there are some 60 Professional-level staff directly committed to the GRID network. This does not count the hundreds of scientific and technical staff associated with, for example, the United States Geological Survey EROS Data Centre (GRID-Sioux Falls); the Japanese National Institute of Environmental Science's Global Centre for Environmental Research (GRID-Tsukuba); and Brazil's INPE (Instituto National de Pesquisas Espaciais) (GRID-Sao Jose dos Campos).

23. The leitmotiv running through GRID Cooperative Centres has four main elements: database development; project support; support for capacity building; and GRID system development. Current and planned activities within these areas are being adjusted to respond to the more than 2,000 references to environmental information themes contained in Agenda 21.

Database development

24. This includes the acquisition, archiving and dissemination of georeferenced environmental data and information to users. GRID plans to be more active in defining the data needs of various major users. This process already began in early 1992 with the series of "Interactive Agency

Briefings" with the United Nations specialized agencies, intergovernmental bodies, such as the Consultative Group for International Agricultural Research, and with UNEP units.

25. Together with the Thailand Meteorological Department, GRID-Bangkok continued work on the development of a cloud-free, composited and geo referenced dataset using 1-km advanced very high resolution radiometer data from the National Oceanic and Atmospheric Administration Satellite for the region covered by the Bangkok Thailand receiving station. A joint venture between the International Centre for Integrated Mountain Development (ICIMOD), the MENRIS (Mountain Environment and Nature Resources Information System) Programme and GRID-Geneva has resulted in the creation of a natural resources database for the Bagmati zone of Nepal.

26. At the request of the Ozone Secretariat, GRID/PAC developed a new database and information retrieval system for managing and reporting production, consumption, export and import statistics for substances controlled by the Montreal Protocol on Substances that Deplete the Ozone Layer. Two separate surveys are in progress with the aim of building reference database systems of geo-referenced environmental data archives for the Latin American region and the African region, respectively.

Project support

27. This involves providing access to GIS and remote-sensing analysis systems and expertise for supporting environmental assessments and analysis of environmental problems of all scales. Emphasis will be increasingly given to environmental impact assessment, risk assessment, indicator development and state-of-the-environment reporting, in order to assist Earthwatch in building up a portfolio of relevant experience in a wide range of environmental fields, whilst tackling concrete problems.

28. In collaboration with Oceans and Coastal Areas PAC, and with funding from the Government of Belgium, GRID-Nairobi is developing a natural resource database for the East African region stretching from Somalia to Mozambique, including all islands which are part of the East African Action Plan. GRID-Nairobi has continued to revise and update the African Elephant Database, funded through the European Community and Elsa Wild-Animal Appeal, and this currently constitutes the most comprehensive source of information on the distribution, conservation and management of elephants throughout Africa. GRID-Nairobi collaborated with Desertification Control PAC in the production of the Global Atlas of Desertification, a project which also produced a number of new global and African datasets.

Support for capacity building

29. This originally implied support for the training of nationals in GIS and remote-sensing technology. The lessons learned since 1985 have broadened and deepened the approach with appropriate partners to include institutional, subregional and environmental information questions. The presence of GRID in the regions should be strengthened, on the one hand to provide data management and GIS technical backstopping to the growing regional and national support programmes of environmental information systems and networks of Earthwatch (GEMS in particular), and on the other to provide a technical data management support service to the UNEP Regional Liaison Offices.

GRID system development

30. This is a "housekeeping" function to ensure that GRID is able to provide modern and cost-effective support to users. It includes routine maintenance and growth, as well as the completion of the "GRID-MetaDatabase", a computerized catalogue of "data about data", which will help fulfill the long-term goal set out in section A, paragraph 2 of the Annex to Governing Council decision 16/25. It also includes the improvement of information exchange via telecommunications.

31. Concerning the GRID network, the inauguration of new GRID Cooperating Centres will be set against a series of requirements, in terms of data types, regional coverage and technical support. Thus, new Centres should fit into a predetermined matrix of information requirements which would serve the broader needs of Earthwatch on the one hand, and countries, subregional bodies and agencies, on the other. Negotiations are under way with the Canadian Center for Remote Sensing (CCRS) for the establishment of a GRID Cooperating Centre in Canada. Negotiations are also at an advanced stage with the Ministry of Education, the Ministry of Foreign Affairs, and the Ministry of Environment of Denmark for the establishment of a Danish GRID centre, with major responsibility for GIS-related education and didactic research.

C. *Industry and Environment Programme Activity Centre (IE/PAC)*

32. The Industry and Environment Office was established in 1975 to bring Industry, Governments and non-governmental organizations together to work towards an environmentally sound form of industrial development. The Industry and Environment Office (IEO) was upgraded to a Programme Activity Centre pursuant to Governing Council decision 16/25 of May 1991. Since its creation, IE/PAC has been seeking to:

(a) Help formulate policies and strategies for sustainable industrial development and facilitate their implementation;

(b) Promote a preventive approach, through the use of cleaner and safer technologies;

(c) Stimulate the exchange of information on environmentally sound forms of industrial development, providing the technical support needed with a view to strengthening those activities.

33. The priorities and long-term goals of IE/PAC set out in section B of the Annex to decision 16/25 cover the following programme areas: promotion of environmentally sound management of selected industrial sectors; promotion of cleaner production; prevention of industrial accidents; and technical support to developing countries. In the same decision the Governing Council also requested IE/PAC to develop its activities in the field of transportation and tourism. In June 1991, IE/PAC was assigned clearing-house functions vis-à-vis the Montreal Protocol on Substances that Deplete the Ozone Layer, activities which are funded by the Interim Multilateral Fund for the Implementation of the Montreal Protocol.

34. In line with the above priorities, IE/PAC consists of five programme areas, namely: Cleaner Production; APELL - Awareness and Preparedness for Emergencies at Local Level; Sectoral Activities; Transport and Tourism; and OzonAction. The Information and Administration Units serve the five programme areas. The total number of staff envisaged for IE/PAC is 14 Professionals and 15 General Service staff (see "Proposed structure"

below). However, in view of the shortage of funds, posts have to remain vacant and are currently filled by consultants on secondment (gratis) to IE/PAC. Currently, five Professionals are on such secondment. Short-term contracts have also been used within the framework of the OzonAction programme.

Proposed Structure of IE/PAC as at 30 November 1992

Director D-2 Deputy Director D-1 (vacant)				
Administration 1 P-3			Information 1 P-4 (vacant) 1 P-3 1 P-2	
Technological Accidents 1 P-5 (vacant)	Cleaner Production 1 P-5 (vacant)	Sectoral Activities 1 P-5	Transport and Tourism 2 P-5 (vacant) 1 P-3 (vacant)	OzonAction 1 P-5

35. To attain the long-term goals set by the Governing Council, that is, to promote sustainable industrial development, the IE/PAC strategy has been to define, catalyse and help formulate policies and tools for environmental management in industry, transport and tourism; exchange and transfer information; support the implementation of international conventions; support capacity building to deal with industrial and environmental issues; promote demonstration projects; and network with other concerned partners in Government and industry, and with academics and environmental groups.

36. In each programme area, activities to implement the IE/PAC strategy have included information exchange through database development and operation of the query-response system; publication of technical guidelines and a regular newsletter and review; training of decision makers in government and industry; and technical assistance.

37. *The Cleaner Production programme* focuses on promoting an integrated preventive environmental strategy with regard to processes and products, in order to reduce risks to humans and the environment. The programme was initiated in 1989, and further developed in line with Governing Council decision 16/33 on the transfer of environmentally sound technologies. Major accomplishments in 1992 include: the continued development of ICPIC (the International Cleaner Production Information Clearing-house); the publication in English, French, Spanish and Chinese of the Cleaner Production Newsletter; the organizing of six training workshops at the request of countries; the launching, jointly with the United Nations Industrial Development Organizations (UNIDO) of the "National Cleaner Production Centres" project; and a demonstration project with the World Bank in China. The UNEP Cleaner Production programme was specifically referred to in Agenda 21, Chapters 20 and 30, as being in need of strengthening. Its progress and achievements since 1989 were evaluated on the occasion of a ministerial and senior-level expert conference in October 1992, which provided guidance on ways and means to develop the Cleaner

Production programme as a tool to help transfer technology, and to catalyse the reconciliation between environmental protection and economic development. The meeting also urged IE/PAC to take the necessary steps to prevent developing countries being subjected to the export and dumping of hazardous technologies.

38. *The APELL - Awareness and Preparedness for Emergencies at Local Level - programme* was launched with the support of the international chemical industry in 1988 to respond to Governing Council decisions on industrial accidents. The programme, aims to create awareness of possible hazards in a community, take preventive measures, and develop emergency response plans. Achievements of the APELL programme in 1992 include: the organization of six training workshops at the request of countries (Brazil, Czechoslovakia, Egypt, Hungary, India, Yemen), to prepare a plan of action to prevent accidents; technical assistance to countries to implement the APELL process (Columbia, Tunisia); publication of a technical report on "hazard identification in a local community"; the publication (jointly with OECD) of an inventory of emergency response centres; and the publication of an APELL newsletter, ensuring information exchange. A total of 72 countries have now designated APELL focal points. The APELL programme was specifically recognized in Agenda 21 as in need of strengthening. The progress made was evaluated by a group of senior-level experts in December 1992, WHO gave particular guidance on the regionalization of the programme and the follow-up to training activities.

39. *Sectoral activities* focus on providing comprehensive guidance in specific sectors of industry to encourage improved environmental performance. The main sectors currently addressed are: mining, aluminium, fertilizer, manufacturing, tanning, textiles, pulp and paper, electronics, and agro-industries. Aspects of the working environment are incorporated into the sectoral activities. Environmental management tools or technologies common to many sectors, such as waste or energy audits, are also addressed. Achievements in 1992 include the publication of three technical reports, providing decision makers in Governments and industry with the necessary guidance for improving environmental management in tanneries and non-ferrous ore mining, and with methodologies to perform audits. Other United Nations agencies, particularly UNIDO and the International Labour Organisation (ILO) and concerned industry sectors are closely associated with this work. In addition, a hazardous waste management training programme, linked to sectoral activities, was developed in parallel to the preparation of the Basel Convention on Transboundary Movements of Hazardous Waste and Their Disposal. A status report on these activities was prepared in December 1992. A training manual on hazardous waste management was published in cooperation with UNEP's Environmental Education and Training Unit, to be used by trainers worldwide. IE/PAC will now closely coordinate its activities in the field of hazardous waste management with the Basel Convention Secretariat.

40. *The Transport and Tourism programmes* are currently being developed, Agenda 21 recognized the work undertaken by UNEP and the World Tourism Organization in the field of tourism and the environment. In 1992, activities dealt with tourism carrying capacity, management of tourism areas, and tourism facilities. Staff constraints prevented the transport programme from being effectively developed.

41. *The OzonAction programme* has been developed since late 1991 by IE/PAC, which was assigned UNEP's clearing-house role under the Multilateral Ozone Fund. In addition to the information exchange components, support in preparing country programmes is provided to countries consuming low levels of ozone-depleting substances. The

OzonAction programme is regularly evaluated by the Multilateral Ozone Fund Executive Committee, which is reviewing progress reports and deciding upon future activities.

42. To support the above five priority activities, IE/PAC is performing the following additional tasks: publication of a quarterly *Industry and Environment* review; query-response service (in 1992 more than 5,000 requests for information were answered); operation of a library; and regular consultations with industry and trade associations. In particular, in March 1992, UNEP and the International Chamber of Commerce (ICC) agreed to establish a joint mechanism to follow up the implementation of the *Business Charter for Sustainable Development* adopted by ICC, as a follow-up to WICEM (the World Industry Conference on Environmental Management) I and II.

43. IE/PAC has received financial contributions for specific activities, in particular from the Governments of France, Finland, the Netherlands, the United Kingdom, the United States and the Commission of the European Communities (CEC).

44. The IE/PAC strategy activities following UNCED were discussed at the end of 1992 by an informal ad hoc group of 15 high-level advisers from Governments, industry and NGOs. They supported the current four activities of IE/PAC, which are at the cutting edge of many fundamental environment and development issues. They recommended that components relating to technology assessment and monitoring of performance should be included in IE/PAC activities. They also underlined the fact that IE/PAC does not yet have the critical mass in terms of financial and human resources to meet the demands of implementing Agenda 21 and even of maintaining the quality of the IE/PAC programme in the future. The group recommended that an advisory body to IE/PAC should be established on a permanent basis.

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ITEM 5:* STATE OF THE ENVIRONMENT

UNEP FOLLOW-UP TO THE 1990 STATE-OF-THE-ENVIRONMENT REPORT: "CHILDREN AND THE ENVIRONMENT"

Report of the Executive Director

Note by the Secretariat

The present report on UNEP's activities in environmental education for children and in enhancing their environmental awareness, and UNEP's activities to enhance the environmental awareness and the active participation of women in environmental protection measures, for their health and well-being and for that of their children is submitted to the Governing Council for information as requested by the Council in its decision 16/15A.

Introduction

1. The Governing Council in its decision 16/15A, paragraphs 4 and 5, requested the Executive Director to accord high priority within the programme of the United Nations Environment Programme to activities related to the achievement of relevant goals and strategies enunciated in the World Declaration on the Survival, Protection and Development of Children and the Plan of Action for Implementing the World Declaration in the 1990s. In particular, priority should be given to: (i) Formal and informal environmental education of children; (ii) Programmes to enhance the environmental awareness of children; (iii) Programmes to enhance the environmental awareness and active participation of women in environmental protection measures for their health and well-being and for that of their children. The Governing Council further requested the Executive Director to include in his 1992 Annual Report material on the implementation of the action required by this decision. As the Annual Report is no longer issued as a Governing Council document 1/, the following constitutes the Executive Director's report to the Governing Council on the subject of follow-up to the 1990 State-of-the-Environment Report: "Children and the Environment".

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* Refers to the number of the item on the Provisional Agenda (UNEP/GC.17/1).

I. FORMAL AND INFORMAL ENVIRONMENTAL EDUCATION OF CHILDREN

2. UNEP's efforts in this field primarily involve the UNESCO/UNEP International Environmental Education Programme (IEEP). Under phase 8 of IEEP, which covers the period 1992-1993, UNESCO, as the main implementing agency for the Programme, is making efforts to improve and strengthen environmental education in schools. In this, UNESCO is receiving financial support from UNEP.

3. During 1990-1992, a typical biennium for IEEP, a number of meetings and seminars were convened for teachers and education administrators. These activities included: an international symposium/workshop; four consultation meetings (two international, one regional and one inter-agency); one subregional expert meeting; eight national seminars; 10 training seminars (four inter-regional, one subregional and five national). Within the same biennium, 20 national-level pilot projects were initiated and completed in addition to the development, and publication of two teaching guides and four issues of the IEEP newsletter CONNECT, for dissemination to focal points and interested people in over 80 countries. In addition, studies on the feasibility of including environmental education in the curricula of schools in Africa and India were completed, paving the way for the development of relevant environmental education programmes.

4. Under another IEEP activity, a pilot set of posters on UNEP's areas of concentration is being distributed. The posters are to guide curriculum developers, trainers and teachers of secondary school pupils over the next 2-4 years in introducing and teaching topics such as climate change; freshwater resources; protection and use of oceans and coastal areas; forests; desertification control; biological diversity; environmental effects of industry; and quality of life. After this initial period, the material will be updated.

II. PROGRAMMES TO ENHANCE THE ENVIRONMENTAL AWARENESS OF CHILDREN

5. Under UNEP's outreach programme to youth, and in partnership with the UNEP Regional Youth Focal Points and other youth groups, a great deal of effort has been made to enhance the environmental awareness of children. The major activities are listed in paragraph 6-17 below.

The Children's Alliance for Protection of the Environment (CAPE)

6. The Alliance is one of UNEP's Regional Youth Focal Points. One of its aims is to educate children about trees, plants, animals and the importance of forests to the health of human beings and our planet Earth. The CAPE Children's Rain Forest Preserve on the Osa Peninsula, Costa Rica, is an example of a project that pursues these aims.

7. CAPE publishes a quarterly newspaper, *Many Hands* written by children and distributed to children around the world, containing stories, poems and cartoons to describe their opinions, ideas and activities. CAPE has completed a 140-page, illustrated, action-oriented curriculum guide to assist parents, teachers and youth leaders in promoting environmental education and action among children.

8. UNEP has provided funding to assist CAPE in the implementation of the above programme on children and the environment.

Voice of the Children International Campaign

9. During the Regional Follow-up Conference to the 1987 Report, *Our Common Future*, organized by the World Commission on Environment and Development in Bergen, Norway, in May 1990, a Children's Hearing was held. Before an audience of 1,400 children and adults, 10 Norwegian children challenged some of Norway's top leaders on questions of environment and development. The hearing was a great success; both the children and the politicians felt that this had been an important event.

10. As a consequence, it was suggested that children all over the world should have a similar opportunity to be able to get in touch with top leaders in their own countries in order to be heard. To achieve that aim a Voice of the Children International Campaign was launched. It was implemented by the Norwegian Campaign for Environment and Development and the Environment Defence Foundation (FUNAM) of Argentina, with support and funding from UNEP. The purpose of the Campaign was to help organize public hearings for children in as many countries as possible all over the world, to encourage children to express their ideas and thoughts on environment and development, and to organize Children's Hearings where children themselves could voice their concern over the state of the environment where they live.

11. A representative group of 21 children from 19 countries of all regions was chosen to attend the United Nations Conference on Environment and Development, held in Rio de Janeiro in June 1992. The Hearing that took place there was opened by street children from Rio, who made a lively presentation of their situation. The group spoke about the issues of poverty, education, war and military expenditures, pollution and environment in general. Each of the children had chosen the issue he or she wanted to raise and they all talked clearly and in strong terms about what was most important to them. Among those attending the Children's Hearing were NGOs, the media and the conference participants.

Scouts and Girl Guides

12. For the past few years, UNEP has been working successfully with the World Organization of the Scout Movement and the World Association of Girl Guides and Girl Scouts to help those organizations upgrade their environmental programmes. Those programmes reach out to Scouts and Girl Guides in more than 150 countries and territories representing over 30 million young people over the age of six. One landmark which underscores the partnership between the two organizations and UNEP was the publication of a training manual entitled *Scouting: Action for the Environment* and of *Water is Life: Protection of freshwater resources through action and by creating awareness among women, youth and children*. Three "Water activity" leaflets were produced to back up the training materials. Radio programmes based on the training kit were produced. A "water badge" was established by the Girl Guides and an "environment badge" by the Scouts.

13. At the World Scout Jamboree in the Republic of Korea in August 1991, UNEP organized highly promising new environmental activities in a training forum called the Global Development Village. This training activity will be replicated by the Scouts for future national, regional and World Jamborees.

GLOBAL 500 Youth Environment Award

14. A special, separate Global 500 Youth Environment Award programme was launched by the Executive Director of UNEP at the World Environment Day celebrations in Brazil in June 1992. Beginning in 1993, these awards will go to children and young people between six and 25 years of age who have

made outstanding contributions to the protection of the environment. The Global 500 Youth Environment Award, linked to UNEP's Global 500 Roll of Honour for Environmental Achievement, passes the torch to future generations and keeps alive the spirit of International Youth Year (1985), when UNEP's Environmental Agenda for Youth was established.

UNEP Goodwill Ambassador for Youth

15. UNEP has appointed singer, songwriter and author Raffi Cavoukian of Canada as UNEP Goodwill Ambassador with special responsibility for youth. Known to millions of fans as Raffi, the artist has dedicated his life and artistic career to encouraging sustainable living and environmental awareness amongst children. He has produced records with sales ranging from gold to triple platinum, concert videos, songbooks and picture books.

16. The explorer Robert Swan, appointed UNEP Goodwill Ambassador with special responsibility for youth activities in 1990, helped UNEP to develop the Global Youth Project, launched in 1991 to create environmental awareness among young people. In addition, he has developed educational packs on the environment.

III. PROGRAMMES TO ENHANCE THE ENVIRONMENTAL AWARENESS AND THE ACTIVE PARTICIPATION OF WOMEN IN ENVIRONMENTAL PROTECTION MEASURES FOR THEIR HEALTH AND WELL-BEING AND FOR THAT OF THEIR CHILDREN

17. UNEP has continued to implement its outreach programme to women. It is widely accepted that the effects of environmental deterioration are often first felt by women and that children are particularly vulnerable to environmental health problems. The thrust of UNEP's outreach programme to women is to enhance the environmental awareness and active participation of women in environmental protection and sustainable development. Although such a programme does not apply directly to children, the result is clearly an improvement for the entire community, including children.

18. The outreach programme to women primarily centres around the activities of UNEP's Senior Women Advisory Group on Sustainable Development (SWAGSD) and the network of the international NGO, WorldWIDE. With UNEP's support, regional women's assemblies were held throughout the world and in November 1991 the Global Assembly of Women and Environment was held in Miami, Florida. At the Global Assembly, which was attended by many women from throughout the world, 47 of the participants between the ages 18 and 25 and from 17 countries, presented the Statement of New Generation Leaders at the Assembly. Efforts are under way to create links between these young women and UNEP's Regional Youth Focal Points.

19. The results of the women's assemblies were conveyed to UNCED. As follow-up to those assemblies, regional seminars for women are being planned and convened in all regions of the world. Examples of such seminars include "Women in Environment" convened by IEEP, the All-India Women's Conference (AIWC), and the Pan-Pacific and South-East Asia Women's Association (PPSEAWA), (New Delhi, India, 4-6 March 1992); A seminar on "Environmental Education for Women", organized by IEEP, PPSEAWA International and its New Zealand Association, co-sponsored by the International Council of Women (Auckland, New Zealand, 7-8 April 1992). The main aims of those seminars were to formulate a holistic approach to sustainable development, keeping in view the interactive dilemma of poverty, environment and development; and to increase understanding of the conceptual issues related to population, consumption, environment, development and women.

20. Another UNEP activity of relevance in the present context comprised a series of workshops, held in 1989-1991, under the UNEP project for training networks on safe handling and use of pesticides for women groups' leaders in Thailand. Under the project, 150 leaders were trained who, in turn, transmitted their knowledge to a total of 27,018 Thai women about the dangers, use and management of toxic substances in the workplace and the home and about how to pass on such information to their families and communities. The workshops were implemented in five Thai provinces by the Thai Department of Non-Formal Education and the Foundation for Life-Long Education, in close collaboration with UNEP. As a result of the success of this project, in 1991 UNEP embarked on a similar exercise in four more countries of the Asia and the Pacific region: Malaysia; Papua New Guinea; Sri Lanka; and Viet Nam. Initial activities, such as the translation of manuals into local languages, identification of training centres, etc. have been completed.

Note

1/ Governing Council decision 16/5, paragraph 1 (b), of 31 May 1991.

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ITEM 5:* STATE OF THE ENVIRONMENT

HAZARDOUS ENVIRONMENTAL EVENTS

Report of the Executive Director

Note by the Secretariat

I. MAJOR ENVIRONMENTAL DISASTERS IN THE WORLD

A. *The eruption of Mount Pinatubo*

1. For 600 years Mount Pinatubo in the Philippines was dormant; on 2 April 1991 it exploded. The major phase of what has become one of the largest eruptions of the century began on 12 June 1991. It reflected the relative movement of plates of the earth's crust along the western Pacific rim, where an oceanic plate slides beneath the plate carrying the Philippines. This interaction generates molten rock that rises and eventually erupts explosively.

2. The most violent eruptions sent clouds as high as 30 km and unleashed avalanches of molten rock down the volcano's flanks. The eruption removed about 140m of the mountain's summit, and deposited 5 to 7 cubic kilometres of pumiceous pyroclastic-flow deposits, and about 0.2 cubic kilometres of tephra on its flank.(1) Tephra deposits virtually filled most headward valleys, with accumulations of coarser lapilli and ash up to 220m deep.(1) Ash was deposited up to 40 km from the volcano. Experts estimate that the amount of volcanic material spewed out was five to eight times that emitted by Mt St Helens in 1980.(2) Although the explosion of Mt St Helens blew out the side of the mountain and spread ash over the surrounding countryside, it sent very little material into the stratosphere.(3)

3. In addition to the eruptions, typhoon-generated rain combined with falling ash on the flanks of the volcano gave rise to "lahars" or mudflows of volcanic debris which swept everything in the way.

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* Refers to the number of the item on the Provisional Agenda (UNEP/GC.17/1).

4. The President of the Philippines declared a state of emergency in the affected municipalities and created a task force to identify and set priorities for rehabilitation activities. The volcano-related deaths from all sources reached 932, but would have been much higher if 64,000 inhabitants from a nearby area had not been evacuated prior to the major eruptions - after an eruption had been successfully predicted by a team of volcanologists. Poor sanitation, malnutrition and epidemics of diseases took a severe toll in the evacuation camps.(2),(3),(4)

5. As yet, only a fraction of the volcanic debris which piled up on the mountain's flanks has washed down in rains. Lahars occur when rain loosens the ash and rocks and sends a torrent, up to 4 metres high, down the slopes. Most of the lahars occurring from June to mid-September 1991 were pumice-rich debris flows, triggered mostly by monsoonal rainstorms. Typhoon-related rainfall in late July produced bigger flows. It is estimated that as much as 1.2 to 3.6 billion cubic metres of sediment could wash down onto low-lying areas around the mountain within the next 10 years during rainy seasons, endangering residents of villages in the shadow of the mountain.(1) Based on observed sediment delivery rates at Mt Galunggung (Indonesia) and Mt St Helens, the sediment delivery rate at Mt Pinatubo should have been highest in 1991 and 1992, and then should decrease in an approximately exponential fashion. However, a typhoon could cause an abrupt increase in sediment delivery rates in any given year.(1) Government engineers have been trying to solve the problem by building defensive dams and catchment basins to channel mudflows away from populated areas, but evacuation is the best method of protecting people. Radio-telemetered lahar sensors and observers at upstream observation posts provide a lahar warning system for those still living in lowland areas.

6. As a consequence of storms since the eruption, a million people have been affected by floods and mudflows. Several people have been killed, villages buried, tens of thousands of houses flooded, roads destroyed and bridges swept away. Winds from the storms have blown ash to the capital, Manila, 100 km to the south, coating buildings and cars with a fine layer of grey-white dust and disrupting aircraft flights.

7. The Government has estimated that eruptions and lahars caused more than $260 million worth of damage to public and private property. A total of 250,000 people lost their homes and farmland was buried. The eruption shut down the former United States Clark Air Base, destroying many buildings and burying it under ash. Due to the continuing problems after the Mt Pinatubo eruptions, estimates for reconstruction costs, future income and infrastructure losses are likely to rise much higher.(2)

Possible effects on climate

8. There is much speculation about the effect the eruption could have on global climate. Cold weather followed the eruptions of Krakatoa in 1883 and Tambora in 1815.(5)

9. During an eruption, the force of the explosion may fire material many thousands of feet into the air, but the larger particles, such as stone, quickly fall out of the plume. The superheated sulphur dioxide and other gases rise into the stratosphere 20 to 30 km above the earth's surface, where very strong winds sweep the plume around the equator and other winds gradually spread it until the entire planet is covered in a thin volcanic veil.

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10. The major factor at work in the climatic effect is not the familiar dust cloud, but a chemical reaction - the vast quantities of superhot gases such as sulphur dioxide (Pinatubo emitted about 18 million metric tonnes of SO_2 into the stratosphere) (2) that reached the stratosphere and surrounded the globe later combine with other compounds to form tiny supercooled droplets of sulphuric acid.(6) The droplets constitute a long-lasting global haze that reflects and scatters back into space some of the sunlight which would normally have reached the ground; this results in a cooling of the earth. The droplets gradually fall to earth, but can be expected to last as long as 8 to 10 years, although they would not have an important impact on the climate for that long. It is provisionally estimated that this sulphur-rich eruption, which is of the type currently thought to have the maximum climatic effects, will temporarily reduce global mean surface temperature by 0.3 degrees - 0.5 degrees C over the next year or so. Radiative forcing calculations indicate that these aerosols can also be expected to exert a significant negative (resulting in cooling) but transient radiative forcing on the surface troposphere system over the next few years. This is opposite in sign to the greenhouse gas-induced forcing, which results in warming. General circulation model (GCM) simulations suggest that such an aerosol-induced forcing could result in a temporary cooling tendency at the surface and dominate the global surface temperature record in the next year or more. If this cooling happens, the consequences of the Pinatubo eruption could dominate the global surface temperature record in 1992 or a little beyond.(7)

11. An average global cooling of half a degree would scarcely be noticed, but it is important in the context of the global warming problem, as it could prevent the identification of the global warming trend that most atmospheric scientists believe is occurring.(5) If this is so, the warming could suddenly surge through the mid-1990s as the plume disappears.

12. There is a fairly constant relationship between the amount of sulphur dioxide in the stratosphere and a decrease in surface temperatures. The eruption of El Chinchon in Mexico in 1982, previously the biggest eruption of the century in terms of material shot to stratospheric heights, emitted sulphur dioxide which some scientists believe had an appreciable effect on the climate. Observations over the past decade indicate that the stratospheric aerosol concentration throughout most of the 1980s remained higher than that measured in 1979. This is probably largely attributable to the major El Chinchon volcanic eruption, together with the effects of a few other minor eruptions. Temperatures were probably forced down by a few tenths of a degree for a couple of years, but this may have been masked by increased ocean temperatures, related to an El Niño event in the eastern Pacific.

13. It is possible that the 1992 El Niño event may also have obscured the atmospheric cooling effects of the Pinatubo cloud.

14. The sulphur-rich emissions of El Chinchon were thought to be unique, but research on Mt Pinatubo indicates that climate-modifying volcanic eruptions are more common than previously believed.

Possibility of ozone depletion

15. There is speculation that ozone depletion will worsen because of the sulphur, which provides a platform for the reactions associated with ozone, involving chlorine from chlorofluorocarbons (CFCs). Some scientists predict that other volcanic particles might enable chemical reactions that would destroy ozone.(6) Atmospheric chemists will be carefully monitoring the stratosphere to find out just how much effect the eruption is having on the ozone layer itself.(3)

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Distortion of satellite images

16. The haze of Pinatubo is changing satellite images of the ground and, because of the back-scattering effect of the haze, the signals detected by remote-sensing satellites tend to be affected. Satellites which gather information in the infra-red part of the spectrum for measuring water vapour and sea surface temperature will need to be recalibrated.(3)

Further eruption

17. During July 1992, there were indications that the mountain might be gearing up for another violent eruption. The volcano emitted ash and steam, a build-up of pressure was indicated as molten rock pushed to the surface and a dome rose slowly out of the water-filled crater. Hundreds of small tremors shook the mountain. Volcanologists were forced to declare a 10 km circle around the volcano a danger zone. By December 1992, the frequency of earth tremors had sharply declined and the movement of magma to the volcano's surface had virtually stopped. The risk of another eruption seems to have passed.

B. *The Environmental Situation in Central and Eastern Europe and the Commonwealth of Independent States*

18. The overall environmental situation in the above countries is serious although a definite and valid assessment has not yet been made. The prime problems are the safety risks of nuclear power generation; air and water pollution; and extensive hazardous waste and toxic chemical problems, with correspondingly great health and ecological impacts and high costs.

19. The institutional base in the area is still being organized; however, it is clear that environmental policies and priorities, methods of planning, the funding of investment, monitoring and enforcement all require major revision. This is not easy under present economic conditions.

20. There is a threat of serious environmental disasters; for example, flash floods in the northern part of Montenegro have damaged the Mojkovac Dam, which retains in a basin about 3.5 million cubic metres of highly toxic waste (mainly toxic mud and sand). The waste, primarily from a lead and zinc mine was stored from 1976 to 1990 and the dam prevents it from reaching the Tara River, which runs past its base. However, the Tara River has been eroding this base, leaving its wall perilously thin. The Tara River flows into the Sava River, a tributary of the Danube, which runs on into the Black Sea. If the Mojkovac Dam were to collapse, the toxic waste would slide down into the river system.

21. The United Nations had imposed economic sanctions on Montenegro, but the sanctions committee gave approval for a joint UNEP/United Nations Centre for Urgent Environmental Assistance/Department of Humanitarian Affairs - Office of the United Nations Disaster Relief Coordinator emergency mission to be sent to Montenegro to plan to repair the dam. The first step of the resulting recommended plan of action was to protect the dam from further erosion by constructing smaller dams upstream to absorb the energy of the river and allow the strengthening of the base of the dam. With the arrival of dam material and other emergency European Community aid, the immediate threat seems to have been averted. The eventual aim is to cover and replant the surface of the dam, which currently causes problems when chemicals from its dried out crust are dispersed in a grey dust which could be having serious effects on people, animals and plants.

22. The case of the Mojkovac Dam should not be regarded as an isolated event. Another example, covered in more detail in the Governing Council report on Emerging Environmental Issues, is the dumping of radioactive materials in the Barents and Kara Seas in the Arctic region. Many similar hazardous situations and accidents in the countries of Central and Eastern Europe and the Commonwealth of Independent States may be pending or may have occurred already, without the knowledge of the international community.

C. *Cyclone in Bangladesh*

23. On 29 April 1991, a cyclone with winds reaching 225 kmh swept across the south-eastern coast of Bangladesh. The winds created waves up to 7m high which razed more than 780,000 homes. By 21 May, 138,866 people had been killed and 138,849 injured.(2)

24. A survey by the Food and Agriculture Organization (FAO) and the World Food Programme (WFP) in June 1991 reported that about 13.4 million people lived in areas affected by the cyclone and, of these, more than 3 million lived in the most severely affected districts - Chittagong, Cox's Bazar, Noakhali and Bhola. Nearly 80,000 people died in Chittagong, where the main port was wrecked and some 20 navy and cargo vessels sank. On Sandwip Island, in Chittagong district, some 35,000 people perished, 60 to 70 per cent of houses were washed away and 70 per cent of crops were lost. Heavy loss of life was also reported in Cox's Bazar district: on the island of Kutubdia - which had a pre-cyclone population of 110,000 - about 20,000 people died and another 2,000 were missing; 80 to 90 per cent of all structures were destroyed and all livestock was lost. Entire populations were wiped out on some of the region's smaller islands. In total, about 780,000 homes were destroyed, and 9,300 schools and 655 health centres were damaged or destroyed.(2)

25. The agricultural sector also sustained serious damage. The FAO/WFP survey reported that 247,000 tonnes of cereal crops and 35,000 tonnes of vegetables and other crops were lost. According to government estimates, 224,000 head of cattle, 218,000 goats and 2.4 million head of poultry perished in the storm. Surviving livestock were in poor health and lacked sufficient feed.(2) In Chittagong district alone, farmers lost about 58,000 hectares of land to sea water, and the salt level in the remaining soils increased 10-fold.(8) The forestry sector suffered considerable losses of fuelwood and timber: an estimated 424,702 m^3 of softwood and 93,445 m^3 of hardwood.(2)

26. Losses in the fisheries sector included damage to 31,000 hectares of shrimp farms and to fish-processing plants, vessels and stocks. Besides rotting corpses, tidal waves washed thousands of tonnes of untreated industrial, chemical and domestic waste into the sea. Coastal mangrove plantations were also damaged, reducing the extent to which the region's coasts are protected from erosion.

27. The overall economic losses are not known, but have been estimated at billions of United States dollars.(8) The Bangladesh Government's priorities in the immediate aftermath of the cyclone were to provide victims with access to clean water and food, and to restore communications and other vital services. The Government immediately allocated $400 million for relief and rehabilitation.(2) Experts say 25 percent of Bangladesh's 143,998 square kilometres should be forested, compared with six percent at present, to ensure ecological balance and to reduce damage from cyclones.

D. *Shetland Islands oil spill*

28. At the time of compiling the present report, the tanker "*Braer*" had broken up in storms a week after running aground on the southern tip of Scotland's Shetland Islands on 5 January 1993. The Liberian-registered ship grounded after losing power during a routine voyage from Norway to Canada. The accident is thought to have spilt the entire cargo of 84,000 tonnes of crude oil into the sea.

29. This spill is more than twice the discharge from the "Exxon Valdez" disaster in 1989 - 24.6 million gallons compared to 11 million gallons. The effects on the local marine environment and rugged shoreline, rich with marine life and sea birds, could be devastating. However, it is hoped that stormy weather may have driven much of the oil out to sea, and that the environmental effects of the accident will be less harmful than those of the "Exxon Valdez" accident due to the fact that the Shetlands environment is warmer than in Alaska. Chapter III of the present report examines the long-term impacts of the Alaskan oil spill.

II. HAZARDOUS ENVIRONMENTAL EVENTS WITH SPECIAL REFERENCE TO AFRICA

Introduction

30. The most serious environmental events to strike Africa in the last two years include natural disasters (drought, earthquakes and epidemics) and anthropogenic disasters. such as the dumping of toxic and hazardous wastes.

A. *Drought emergency*

31. Severe droughts occurred during 1982-1984, affecting the Sudano-Sahelian area of Western Africa, eastern and southern Africa; as well as South-East Asia, the Western Pacific and Australia; and northern and north-eastern regions of Latin America. The worst-affected areas, both in terms of drought intensity and duration, were in Africa (9) where, for example, during 1982-1984 some one million Ethiopians starved to death from the combined effects of drought and civil war. A somewhat less severe drought occurred during 1986-1987 over parts of the African continent.(10) Then, in 1991-1992 the worst drought in recorded history affected southern Africa, as well as parts of eastern Africa and the Sahel - most affected countries experienced delayed rainy seasons and significant rainfall deficiencies. Some rainfall stations, e.g. in Central Sudan and in some southern African countries, reported the lowest rainfall ever recorded. The rainy season re-established itself in the latter part of 1992. Even so, soil erosion, sometimes severe, was a secondary effect of the rain returning to the parched ground, denuded of vegetation.

32. The drought affects millions. In 1992, a region of nearly 700 million hectares in southern Africa was struck by the drought, affecting 130 million people in Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, Swaziland, the United Republic of Tanzania, Zambia and Zimbabwe. The size and scale of the drought threatened the social fabric and fragile economies of several of those countries.(10)

33. Refugees, desperate for food and water, and in some cases escaping factional fighting, fled to neighbouring countries, often arriving in a deplorable state, suffering from malnutrition and disease. The receiving countries are struggling to care for them, but various problems, including civil strife, have kept supplies from reaching the starving.

34. Drought has accelerated the migration of farmers from the countryside to the cities, putting additional pressure on basic city services such as water and sanitation. Water-dependent industries shut down, throwing thousands out of work. At the height of the drought, Bulawayo almost ran out of water completely.

35. There has been conflict between conservationists and farmers, desperate to use game reserves for grazing land. Added pressure has been put on reserves by people poaching animals and collecting fuelwood. Wild animals have been dying of starvation and thirst, so that culling and translocation have been required.

36. The severity of the drought has taken a heavy toll on food supplies. Millions of livestock and large areas of crops have perished. Some 6 million people in Malawi, 4.6 million in Zimbabwe and 3.15 million in Mozambique are at risk from severe malnutrition. Thousands are dying in war-torn Ethiopia, Somalia and the Sudan. It is estimated that, altogether, 20 countries in Africa are facing exceptional food emergencies. Imports of food and lost production of export commodities due to the drought are costing impoverished treasuries scarce foreign exchange.

37. International food aid has been crucial. For example, a two-day pledging conference on the threats posed by the drought, with special reference to southern Africa, took place in Geneva from 1 to 2 June 1992. It was jointly hosted by the United Nations and the Southern African Development Coordination Conference (SADCC). A sum of nearly $600 million was pledged, mainly by Western countries, for food and other aid for impoverished nations.(10)

38. In January 1993, FAO forecast that Africa would need massive food aid in 1993 to prevent thousands of people from dying. Although food distribution has improved in Somalia, drought and civil strife mean millions in Ethiopia, Liberia, Sierra Leone, Sudan and elsewhere in Africa will need food assistance through 1993. According to FAO - Angola, Botswana, Ethiopia, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mauritania, Mozambique, Namibia, Rwanda, Sierra Leone, Somalia, Sudan, Swaziland, the United Republic of Tanzania, Zaire, Zambia and Zimbabwe faced exceptional food emergencies.

39. Although the Drought Monitoring Centre in Nairobi had predicted the drought, the world took action only after observing its impact in 1992. In the interim, thousands of lives were lost. If the predictions had been heeded, more timely action could have allowed the affected countries to prepare better for the impact of the drought.

40. Today it is generally acknowledged that the El-Niño Southern Oscillation (ENSO) events are responsible for major disturbances of the global atmospheric circulation. ENSO is a recurrent combination of ocean temperature and air pressure anomalies which occurs mainly in the Pacific but whose effects are felt world-wide. For example, ENSO results in bands of high pressure over the African region which cause rain-bearing clouds to disappear. Such "warm" episodes occur about twice a decade (although not all are severe enough to disturb significantly the global weather patterns) and usually last from 12 to

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18 months. In Africa it has been observed that, during an ENSO episode, the Intertropical Convergence Zone is generally diffuse due to weak monsoons and enhanced subsidence. The evolution of the 1991-1992 ENSO had similar characteristics to that of 1982-1983. The drought of 1991-1992 is in many ways very similar to that of 1983-1984, although the impact of the current drought may be more severe than that felt in 1983-1984, due to a more degraded ecosystem today.

41. ENSO is also blamed for recent drought ravaging crops and costing hundreds of millions of dollars in the Asian and Southern Pacific region, including in Australia, China, India, Malaysia, Philippines, Sri Lanka, and Taiwan.

B. *Earthquake in Egypt*

42. Many hundreds of people died and thousands were injured in an earthquake measuring between 5.5 and 6.0 on the Richter scale that struck Cairo on 12 October 1992. Earthquakes are rare in Egypt and this was the most powerful ever recorded. Cairo's 15 million inhabitants make it one of the most densely populated cities in the world, (11) and residents were caught off guard when the earthquake struck. Most deaths occurred in the poor districts where many families live in badly built tenement blocks and many building collapses were reported.

C. *Dumping of Hazardous Wastes*

43. Large amounts of hazardous wastes have been exported or proposed to be exported to developing countries, particularly in Africa, from industrialized countries.

44. The Organization of African Unity (OAU) held a conference in Bamako, Mali, in January 1991 and drew up an African Convention on the Ban of All Forms of Hazardous Wastes Into Africa and the Control of Transboundary Movements of Such Wastes Generated within Africa (the Bamako Convention). It was signed at the conference, and placed a ban on the import of hazardous wastes into Africa from non-contracting Parties, and bans the transit of hazardous wastes through the territory of the respective States in order to protect human health and the environment. Such import of hazardous wastes shall be deemed illegal and a criminal act. Despite this, the trade continues, as is seen from the examples in paragraphs 46 and 47 below.

45. In October 1992, a deal between two European firms and a national of Somalia for the annual shipment of about half-a-million tonnes of hazardous wastes to Somalia was aborted by UNEP. UNEP was able to follow up the issue very quickly with the concerned Government.

46. In March 1992, Egyptian authorities at the port of Alexandria refused to allow the unloading of a cargo of 950 tonnes of plastic wastes derived from scrap cars. The waste originated from a smelter near Koblenz, Germany, the "Blei und Silberhuette Branback BSB". The shipment had been registered as a "substitute fuel" which, under German law, is treated as a commodity and requires no special export license. It was to be delivered to Egyptian cement kilns as fuel for their ovens. The waste was loaded at Rotterdam, Netherlands, where Dutch port officials discovered that it was contaminated with 1.7 per cent lead, other heavy metals and polycyclic aromatic hydrocarbons. If burned in cement kilns, the toxic fumes would endanger the health of the local population. Under European Community regulations, the wastes would have been classified as

hazardous, and would have been subject to special and expensive disposal requirements. A similar shipment of 1,600 tonnes of the same wastes was unloaded at Alexandria in February 1992 for recycling by local cement firms. The German exporter, "Taurus Umwelttechnik", had further plans to export 20,000 tonnes of hazardous wastes to Egypt throughout 1992.

D. *Danger of further gas release at Lake Nyos, Cameroon*

47. In 1986, a cloud of gas released in an explosion from Lake Nyos, Cameroon, asphyxiated 1,734 people and many livestock in the worst natural disaster of the country's history. The carbon dioxide apparently came from a chamber of molten rock under the lake. This is the first known event of its kind.(8) In 1992, following concern that another build-up of gases is occurring, researchers began studying the feasibility of installing pipes in the lake to allow gases to be released harmlessly before they build up to dangerous levels.

E. *Epidemics*

48. Epidemics are not uncommon in Africa, and the number of cases of some diseases continues to rise. The year 1991 was characterized by unusually high levels of transmission of cholera, with many deaths. In Chad, for example, most of the country was plagued by the epidemic which reportedly affected 12,204 people and caused 1,262 deaths. At least 21 countries were affected, with a total of 153,367 reported cases and 13,998 deaths.(13) These are the highest totals ever recorded in Africa and, taking into account the incompleteness of data, indicate a major epidemic in the continent.

III. UPDATE ON PAST HAZARDOUS ENVIRONMENTAL EVENTS

A. *Long-term impacts of the Alaskan oil spill*

49. On 24 March 1989, the supertanker "*Exxon Valdez*" ran aground on Bligh Reef, Prince William Sound, Alaska, spilling more than 38 million litres of crude oil into this environmentally sensitive area. This was reported to the Governing Council in 1991.(14)

50. Immediately after the spill, the Exxon Valdez Oil Spill Trustees began a series of assessments to determine its effects on the environment, including marine and terrestrial mammals, birds, fish and shellfish, and on non-living resources such as archaeological sites. The assessments found evidence of a wide range of impacts, some immediate and acute, some subtle and persistent.(15) However, there seems to be no threat of species extinctions and food chains are apparently intact. The direct effects of the spill are expected to last up to 15 years and the long-term impacts are uncertain. The low temperatures of the area may influence the course of recovery by decreasing the rate of natural weathering of oil by physical processes or through biodegradation. These mechanisms are slower in colder climates and, as a result, petroleum hydrocarbons may be biologically present in the environment for longer periods of time.

51. Assessment of the spill is also under way by the Hazardous Materials Response and Assessment Division (HMRAD) of the United States Department of Commerce's National Oceanic and Atmospheric Administration (NOAA). NOAA/HMRAD provides scientific support to the United States Coast Guard during spills of oil and hazardous materials. In 1990, NOAA/HMRAD assumed sponsorship of a long-term monitoring programme begun shortly after the spill. This programme aims to define and quantify effects from both oiling and intrusive shoreline

treatment (e.g. high-pressure, hot-water washing) on intertidal biological communities, and to track the course of biological recovery at affected sites. In addition, concerns about contamination of subsistence seafoods harvested in the affected region by native communities have resulted in the initiation of a programme (co-sponsored by NOAA/HMRAD) to collect and analyse seafood species for petroleum hydrocarbon content.

52. Humpback whales *(Megaptera)*, Steller's sea-lions *(Eumetopia jubata)*, sea otters, harbour seals and killer whales were included in the Exxon Valdez Oil Spill Trustees' damage assessment studies.(15) The results indicated that the spill had affected the population of humpback whales: in 1989 none were seen in Lower Knight Island Passage, a preferred habitat - although this may be attributable to other causes, such as the increase in vessel traffic throughout the area during the spill response.

53. Data from the sea-lion study were inconclusive. Several sea-lions were observed with oiled pelts, and petroleum hydrocarbons were found in some animals' tissues. Assessing the effect of the spill on the sea-lion population was complicated by seasonal movements of sea-lions in and out of the spill area, an ongoing population decline and a pre-existing problem with premature pupping.(15)

54. Mortalities were observed in some pods (groups) of killer whales - although the cause of these is uncertain. Several photo-identification censuses revealed that a significant number of killer whales were missing from at least one, and possibly two, pods in Prince William Sound. Assuming that whales missing for two consecutive years are dead, the mortality rates were 19.4 per cent in 1988-1989 and 20.7 per cent in 1990-1991.(15) However, it is not known what the overall mortality rate was for the entire population in the Sound. Changes were also observed in killer whale distribution and social structure.

55. Spilled oil covered large areas inhabited by sea otters and it was estimated 3,500 to 5,500 otters died from acute exposure to oil. Continuing long-term exposure to petroleum hydrocarbons may have a chronic effect on sea otters. High concentrations of petroleum hydrocarbons were detected in coastal sediment samples within the spill zone in western Prince William Sound and in staples of the sea otter diet, such as intertidal mussels and benthic marine invertebrates. Analyses of blood from sea otters in 1990 and 1991 indicated slight but significant differences in the blood of exposed animals. Abnormal patterns of mortality are continuing in sea otter populations.(15)

56. Two hundred harbour seals are estimated to have been killed by the spill. During 1989, oiled harbour seals were abnormally lethargic and unwary. One year after the spill, petroleum hydrocarbon concentrations in bile were five to six times higher in seals from oiled areas than in seals from unoiled areas, indicating that seals were still encountering oil in the environment and were mobilizing fat reserves containing petroleum hydrocarbons. Surveys conducted in August 1991 showed that seal populations at unoiled sites had increased significantly, while those at oiled sites had risen only slightly. (15)

57. Birds were among the most conspicuous victims of the oil spill. An estimated 375,000 to 435,000 were killed by the spill, with murres (from the auk family - *Alcidae*) as the species most severely affected. Approximately 172,000 to 198,000 adult breeding murres are believed to have been killed. Reproductive failure in several large colonies in years since the "*Exxon Valdez*" incident has been attributed to changes in numbers and behaviour due to the spill.

58. In 1989 and 1990 about 40 per cent of the harlequin ducks *(Histrionicus)* sampled had tissues contaminated with petroleum hydrocarbons, and about 33 per cent in the spill area had reduced body weight and were generally in a poor condition. The 1991 survey indicated a decline in the harlequin population and an almost total reproductive failure in oiled areas of Prince William Sound.(15)

59. The coastal tidal zone – normally highly productive and biologically rich – was the most severely contaminated habitat in 1989. It was also adversely impacted by shoreline treatments such as high-pressure, hot water washing. During the winter of 1990-1991, significant concentrations of petroleum hydrocarbons built up in sediment traps, indicating that oil is being removed from the beaches by cleaning and natural processes and is being transported subtidally. Intertidal organisms are still being exposed to petroleum hydrocarbons from subsurface oil on beaches, however the level of exposure as reflected in the total polynuclear aromatic hydrocarbon loading in tissues has declined steadily since the spill.

60. No massive kills of adult open-water fish were observed following the spill. However, there was some indication of adverse effects on eggs and larvae of some species of fish, especially those that inhabit and spawn in the intertidal zone. The longer-term impacts on fish populations are not clear.

61. The spill had a direct impact on archaeological resources, subsistence and recreational activities, and the aesthetic qualities of the region. Clean-up activities and the associated increase in human activity throughout the spill zone resulted in additional damage and erosion to the area. Spill response data revealed that a minimum of 35 archaeological sites had been damaged, including burial and home sites. In addition to oil contamination, increased knowledge of the location of archaeological sites puts them at greater risk from looting.

62. Following the oil spill, recreational use of public lands and waters declined. Sport fishermen, hunters, campers and sea kayakers avoided oiled areas and many adjacent areas that were affected by clean-up activity. In 1991, oil still remained in many areas used for recreation.(15)

B. *The Iraq/Kuwait conflict in 1991*

63. A separate report about developments with respect to the environmental situation in Kuwait is presented to the Governing Council for consideration at its seventeenth session.

C. *The Chernobyl nuclear power plant accident in 1986*

64. An update on the Chernobyl accident is presented as a separate report to the Governing Council for information at its seventeenth session.

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ITEM 5:* STATE OF THE ENVIRONMENT

UPDATED SCIENTIFIC REPORT ON THE ENVIRONMENTAL EFFECTS OF THE CONFLICT BETWEEN IRAQ AND KUWAIT

(Second update of the UNEP report on the United Nations Inter-Agency Plan of Action for the Region Covered by the Regional Organization for the Protection of the Marine Environment (ROPME)

Report of the Executive Director

Introduction

1. Pursuant to UNEP Governing Council decision SS. II/8 of 3 August 1990 on the situation in the Middle East, UNEP took an initiative to intensify cooperation within the United Nations system for optimum use of the diverse capabilities of the system to respond rapidly to the environmental crisis resulting from the hostilities in the ROPME area (member States of ROPME: Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates. To that end, the United Nations Inter-agency Plan of Action was developed in cooperation with ROPME and a number of United Nations specialized agencies, and was adopted at the Second United Nations Inter-agency Consultation (Geneva, 15 March 1991). This was followed by the adoption of resolutions by the Governing Council of the United Nations Development Programme (UNDP) in June 1991, and by the Second Committee of the General Assembly at its forty-sixth session in November 1991. In addition, at its third special session the UNEP Governing Council adopted decision SS. III/3, part II on the state of the environment resulting from the conflict between Iraq and Kuwait.

2. The present report, prepared in accordance with Governing Council decisions 16/11 A and 16/17 summarizes the results of the inter-agency efforts of the United Nations in responding to the environmental crisis in the region. It provides an update of the environmental situation, based on the scientific results obtained through the surveys and assessments carried out under and in relation to the Inter-agency Plan of Action and briefly describes the United Nations' initiatives to mitigate the adverse effects of the conflict and rehabilitate the environment in the region.

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* Refers to the number of the item on the Provisional Agenda (UNEP/GC.17/1).

II. UNITED NATIONS INTER-AGENCY PLAN OF ACTION

3. The United Nations agencies concerned with the various aspects of the environmental crisis in the ROPME region, led by UNEP and in cooperation with ROPME, developed the United Nations Inter-agency Plan of Action soon after the liberation of Kuwait. The main objectives of the Plan were:

- To assess the environmental consequences of the war on the marine and coastal areas, atmosphere and terrestrial ecosystems and the hazardous waste situation in the region; and

- To propose a programme for the mitigation of the adverse effects, and for rehabilitation and protection of the environment affected by the conflict.

4. The specific objectives of the first (survey and assessment) phase of the Plan of Action were:

- To conduct a multidisciplinary initial survey and preliminary assessment of the marine and coastal environment, the atmospheric environment, the inland terrestrial environment and hazardous waste management in the war-impacted areas;

- To identify priority areas at risk and resources threatened in these areas;

- To formulate a proposal for the mitigation of the adverse effects, rehabilitation and protection of the environment in the area, to be submitted to the Governments of the region through ROPME for the necessary follow-up;

- To develop, establish and operate a computerized data system (CDS) for storage, retrieval and processing of all data and information gathered through the Plan of Action; and

- To provide relevant training to ROPME experts on CDS operations and data management.

5. Coinciding with both the Second United Nations Inter-agency Consultation (Geneva, 15 March 1991) and the Informal Ministerial Consultation, held in Nairobi (11 to 13 March 1991), UNEP's Executive Director established a Special Trust Fund devoted exclusively to financing the United Nations Inter-agency Plan of Action (except for the activities of the International Maritime Organization (IMO) which were to be funded by a special IMO Persian Gulf Oil Pollution Disaster Fund). A total of about $2.67 million was received in the Trust Fund from the Governments of Japan, Norway, Netherlands, Norway and the Commission of the European Communities (CEC) as follows: Japan (general purpose) $1.11 million; Norway (atmospheric components) $1 million; the Netherlands (computerized data system) $0.5 million, and the CEC (general purpose) ECU 50,000, i.e. about $60,000.

6. The first phase of the United Nations Inter-agency Plan of Action started on 20 April 1991 and was completed in 90 days, i.e. on 21 July 1991. It involved initial surveys and a preliminary assessment of the environmental damage to the region in the aftermath of the conflict. The activities under the Plan of Action were coordinated by UNEP and ROPME and implemented by some 50 experts from 12 United Nations agencies and international organizations, including the International Maritime Organization (IMO), the World Health Organization (WHO), the World Meteorological Organization (WMO), the Intergovernmental Oceanographic Commission (IOC) of the United Nations Educational, Scientific Organization (Unesco), the United Nations Industrial Development Organization (UNIDO), the United Nations Centre for Human Settlements (UNCHS/Habitat), the International Atomic Energy Agency (IAEA),

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the Food and Agriculture Organization of the United Nations (FAO), the World Conservation Union (IUCN), the World Wide Fund for Nature (WWF) and ROPME, as well as about 20 institutions from within and outside the region. Each of the cooperating agencies was responsible for the implementation of the component(s) of the Plan of Action relevant to its specific mandate (see table below). However, all agencies worked in concert in order to ensure the maximum coherence of results and recommendations.

Table
Activities of the United Nations Inter-agency Plan of Action and the responsible Organizations/agencies

Areas/Activities	*Responsibility*
a) *Coastal and marine environment*	IMO
- Oil pollution response and clean-up operations	IOC/IAEA
- Oil pollution assessment and monitoring, of water quality	ROPME/IOC
- Oceanographic observations and data support	IUCN/WWF/IOC IUCN/FAO/IOC
- Coastal/marine ecological assessment	UNCHS (Habitat) ROPME/UNEP
- Living marine resources	
- Coastal infrastructure	
- Remote sensing/database support	
b) *Atmosphere*	
- Air quality/effects on human health	WMO/WHO/IAEA
- Air/sea exchange	IOC
- Meteorology and long-range air pollution transport	WMO
c) *Terrestrial*	
- Food, soil, agriculture	FAO/IOC
- Terrestrial ecosystem/desertification	UNEP (Regional Office for West Asia)
- Food safety, drinking water	WHO
- Shelter/welfare	UNCHS (Habitat)/WHO
d) - *Harzadous waste management*	
- Assessment of damage to industrial sector and risk of release of hazardous wastes	UNIDO/WHO/UNCHS
- Industrial Safety	UNEP(Industry and Environment Office)/UNIDO

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II. STATE OF THE ENVIRONMENT

7. The preliminary results of the Plan of Action were published by UNEP in its report of 12 October 1991, [1] and were updated on 12 June 1992. The report of 12 October 1991 was submitted to and endorsed by the fourth extraordinary session of the Council of ROPME held in Kuwait on 16 and 17 October 1991. The initial findings of the Plan of Action are summarized below, together with some more recent observations after the capping of the last oil well fire on 6 November 1991, and the completion of a 100 - day research cruise conducted in the ROPME sea area by the research vessel "Mount Mitchell" of the National Oceanic and Atmospheric Administration (NOAA) of the United States during the period February - June 1992.

A. *Marine and coastal environment*

1. *Results of the initial surveys of the United Nations Inter-agency Plan of Action*

8. Information gathered during the initial surveys indicated that, between January 19 and 28, 1991, an estimated 6-8 million barrels of oil were spilled into the ROPME sea area from two major sources: four sunken and leaking vessels, including Iraqi oil tankers, and leakage from the Mina Kuwaiti Al-Ahmadi Sea Island terminal mooring area and the Iraqi Mina Al-Bakr loading terminal. Additional sporadic discharges occurred from these and other sources through June 1991. Several hundred thousand barrels of oil seeped from damaged Kuwaiti and Iraqi oil facilities and several small Iraqi tankers sunk in the northern part of the sea area produced additional pollution through the spring and early summer of the region. Moreover, atmospheric fallout from Kuwait's damaged wells gradually introduced a considerable additional quantity of oil in the form of small oil droplets and oily soot.

9. As the main body of the oil slick moved south along the Saudi Arabian coast, winds repeatedly drove it onto shore and then back into the sea, leaving most of the northern shoreline of Saudi Arabia heavily contaminated, particularly in the area where the spill was blocked by Abu Ali Island and its causeway to the mainland. As the oil continued to move into the area, it backed up into the farthest recesses of the embayments north of Abu Ali Island. The most heavily affected areas were the lagoons, salt marches and bays located between Ras Al-Khafji on the north and Ras Abu Ali to the south.

10. The estimates of the extent of damage to the marine habitats in those areas varied. Early data indicated that at least 30,000 marine birds perished as a result of exposure to oil (excluding those trapped in oil pools formed in the Kuwaiti desert). Some reports showed that approximately 20 per cent of the mangroves on the eastern coast of Saudi Arabia have been oiled and about 50 per cent of the coral reefs have been affected. There was also some indication that hundreds of square kilometers of sea-grass beds (feeding grounds for dugongs and turtles) as well as tidal mud flats might have been inundated by oil. The Iranian coast north of Bandar Khomeyni was also

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[1] Report on the United Nations Inter-agency Plan of Action for the ROPME Region - Phase I: Initial Surveys and Preliminary Assessment, UNEP, 12 October 1991

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affected, but to a lesser extent, while the Iraqi coast was only slightly affected. The Kuwaiti coast suffered only relatively light damage, while the three coral reef islands off the Kuwaiti coast did not show any significant degree of ecological damage.

11. Based on observations during the initial surveys, the pollution by oil in the marine environment was not limited to oil spills. Fallout of soot and unburned oil products emitted from the burning oil wells formed slicks on the surface of the water, releasing polycyclic aromatic hydrocarbons (PAHs) and heavy-metal-laden soot particles into the water column. It was also observed that hundreds of small boats and dozens of military ships had been sunk in the area, many loaded with ordnance. The physical destruction of beaches by digging trenches, laying mines, barbed wire and other defence installations not only damaged the intertidal zone, but poses a great danger to human life as well as to turtles nesting on the islands. The destruction of sewage treatment plants in Kuwait resulted in the release of over 50,000m^3/day of raw sewage into Kuwait Bay, threatening the intertidal ecosystem downgrading the quality of seawater used for desalination and polluting public beaches.

2. *Results of the "Mount Mitchell" research cruise*

12. Considering that the above results were essentially preliminary and were based primarily on the initial surveys, it was deemed necessary that the scale of the impact of the massive oil spill on the marine ecosystem, particularly on sensitive habitats, as well as on the fisheries (fish and shrimp) resources of the region as a whole would have to be determined by intensive monitoring and research. With that in mind, the intensive United Nations effort to assess the state of the marine environment culminated in the launching, in late February 1992, of a 100-day research cruise in the ROPME sea area by the fully equipped 231 foot research vessel "Mount Mitchell" of the NOAA of the United States of America, in cooperation with ROPME and Unesco/IOC. The expedition involved a broad range of investigations of the impact of the oil spill, including shoreline and nearshore studies along the most heavily impacted areas of the Saudi Arabian coastline, regional circulation and sediment studies, studies of coral reefs, and investigations of seafood quality. The investigations were carried out at a large number of stations covering almost the entire ROPME sea area as shown in the figure below. The results of the international expedition will provide the scientific basis for the rehabilitation of the marine and coastal environment in the ROPME sea area. In addition, the information gained should be of considerable value, not only for the present spill, but also for dealing with future large spills throughout the world. The main findings and conclusions drawn to date on the basis of these results are summarized in paragraphs 13-27 below:

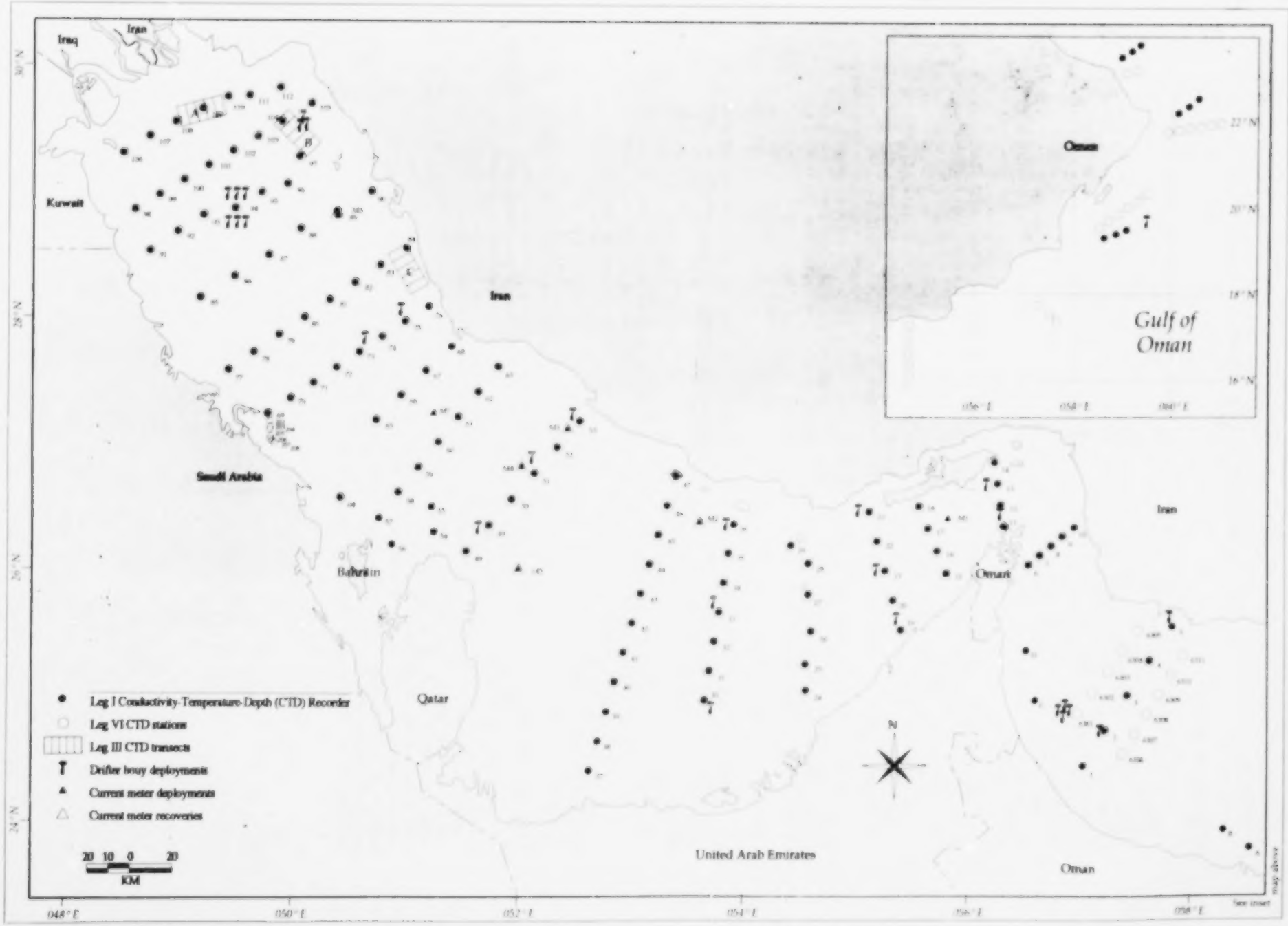

Figure: Coverage and stations of the "Mount Mitchell" research cruise in the ROPME sea area (February-June 1992)

3. *Impacts of oil pollution*

Effects on water

13. Evaporation studies undertaken during the cruise indicated that winter evaporation in the ROPME sea area can be double the summer amount: hence was the rapid evaporation of the oil spill, as it occurred under winter conditions. In the water column, decomposition of the oil was found to be relatively fast. The result is that very low concentrations (no higher than 4 micrograms per liter) of the oil were present in the samples collected from the water column. In contrast, concentrations of the breakdown products (oxidation products) of oil were found to be about ten times higher than concentrations of their parent hydrocarbons. However, with distance concentration dropped rapidly, with the most heavily oiled zones at the heads of the bays.

14. Subsurface oil was present in many areas in a variety of habitats. Oil-saturated intertidal waters were common in many of the intertidal habitats. Distribution of total hydrocarbons in water showed a different pattern, with Ras Tanajib being the highest (12.1 mg per litre), followed by Ras Al-Mishab, Ras Al-Khafji, Ras Al-Zoor, Manifah, Mardoumah, Ras Abu Ali (coastal), and Jurayd Island. Samples collected off Jana Island, Juaymah and Ras Abu Ali (deep sea) were found to be free of hydrocarbon concentrations.

15. The results of the analyses of trace metals in water samples, based on historical data from within and outside the region, do not indicate that the trace metal content of the water has increased as a consequence of the oil spill during the recent hostilities in the region.

Effects on sediments:

16. The subtidal sediments in the near offshore areas of the ROPME sea area, from Kuwait to Qatar, were found to contain relatively low and uniform concentrations of polynuclear aromatic hydrocarbons. The oil components cause contamination of the subtidal sediments in sheltered muddy bays were found, with the highest concentrations (500 - 900 parts per million total hydrocarbons) occurring in the heads of Dawhat al Musallimiyah and Dawhat ad Dafi. In the areas investigated there was no evidence of large-scale sinking of oil. Following diverse observations at over 150 locations, oil was observed at three sites, all of which were channel bottoms where tarballs were accumulating. During sediment core handling, only a very few samples had a petroleum odour or showed visible oiling of the surface sediments. It is believed that the contamination of the bottom sediments probably occurred through the deposit of oiled sediments eroded from the intertidal zone. Deep burial by sediment deposition was not common, but penetration measured in tens of centimetres was enhanced by penetration of oil into burrows (especially the numerous intertidal crab burrows) and by the presence of bubble sand and evaporite crystals in the sediment. Sheltered sand beaches, resulting from wind-blown coarse sand being added to the beach zone, present a special problem because of deep penetration of oil into the coarse sand (up to 50+ cm) and slow erosion rates. In contrast, many of the exposed sand beaches and intertidal sand flats showed significant erosion of the original oiled sediment (estimated 50-70 per cent removal in some areas). Some of this material was being transported into the subtidal region in the form of tarballs and finer oil/sediment particles.

17. High-performance liquid chromatography screening was carried out on more than 100 sediment samples to evaluate the extent and magnitude of oil contamination within the heavily impacted area between Abu Ali and Tanajib. A number of sediments showed elevated concentrations of aromatic compounds. Oiled sand clumps were observed floating on the water surface, thought to be caused by air bubbles becoming attached to sand during low tide, allowing the clumps to float off with the rising tide. Eventually, wave action will break up the bubbles and the sand will sink, providing a mechanism for deposition of contaminated coarse sediment in otherwise sheltered, muddy environments.

18. In contrast to the visual observations, preliminary chemical analysis (fluorescence), using a method for comparison of relative concentrations among the sample set, provided some indication of wide-spread, low-level oil contamination of the fine-grained sediments. The results showed that the highest oil concentrations in subtidal sediments occurred within the top 5 cm, with concentrations usually dropping off by a factor of 5 to 10 between the 0-5 cm and the 5-10cm intervals. At depths below 10 cm, concentrations were always at background levels. Highest levels of contamination were found in the muddy sediments accumulating in the dredged channels at the head of Dawhat ad Dafi and relatively high concentrations were also measured in the sheltered interior bays of Dawhat al Musallimiyah. Intermediate levels of contamination were found in the fine-grained sediments collected from mid-bay, from in the lee of sand shoals, and from rocky platforms. The lowest levels were found in the coarse-grained sand from the outer coast transects, at the bottom of channels, and from the thin sediment veneer on the mid-bay shoals.

Effects on the shoreline

19. At the time of the cruise, about one year since the spill during the conflict between Iraq and Kuwait, much of the residual oil exhibited considerable weathering, compared to the oil which was initially stranded on the shoreline. However, there were areas of heavy oil which remained relatively fresh and continued to be released as sheens. Oiled areas in exposed habitats were generally in an advanced state of weathering, and were more weathered than in moderately and sheltered habitats. As indicated by detailed chemical analysis, using various techniques to fingerprint the oil, most areas sampled in Dawhat al Musallimiyah, Dawhat ad Dafi, and Tanajib were impacted by oil from the spill. However, there were areas, such as the extensive pavement formed on Abu Ali Island and isolated sites in Dawhat ad Dafi, that were shown to be contaminated by oil from previous spills.

Effects on coral reefs

20. Observations taken before and during the "Mount Mitchell" cruise were unable to reveal any demonstrable, direct effects of the 1991 oil release on the coral reefs in most of the ROPME sea area. This does not indicate that oil spills have no potential for causing damage to coral reefs. The disturbance caused by an oil spill and other forces may have increased the susceptibility of real organisms to natural stress.

21. Generally, coral reefs examined throughout much of the "Mount Mitchell" cruise appeared to be in good condition. However, the corals of the three reefs examined in Kuwait showed signs of stress. At Qita't Urayfijan, Taylor Rock and Kubbar Island, numerous corals were bleached or had suffered recent partial or total mortality. At the first two sites, several species of corals (from various families) were affected, while at Kubbar Island large sections

of bleached tabular *Acropora* species were particularly conspicuous. It must be realized that the survey team visited only an arbitrarily selected portion of each reef and a limited number of reefs at each station. However, it is considered unlikely that the study of other, arbitrarily selected regions of these reefs would have led to substantially different observations.

22. In light of the observations in paragraph 21 above, it is to be kept in mind in the past the reefs of Kuwait, including Kubbar Island reefs have been observed to show bleaching and resul'ant mortality following extreme periods of cold weather and reduced sea-surface temperatures. It is known that during the winter of 1991-92 seawater temperatures were approximately 4.5°C lower than normal. When the corals of Kuwait were visited in November 1991, no signs of stress on the corals of Kubbar Island were observed. But, apparently, the cold waters off Kuwait during the winter of 1991-92, high precipitation in the adjacent riparian watershed, and other climatological phenomena may have contributed to the observed condition of those corals. However, one cannot rule out the possibility that the corals were affected by the environmental damage that resulted from the conflict, including the adjacent oil release, smoke clouds, and sewage and pollutant releases. It is difficult to single out the effects of these and other sources of stress on the corals. In addition, the many sources of natural and anthropogenic stress to which these reefs were exposed may have important additive or synergistic effects. Subsequent analysis of the coral skeleton showed definite and consistent signs of stress in the massive coral *Platygyra daedalea* at Qita't Urayfijan, as well as in some colonies at the reef at Khafji in northern Saudi Arabia.

23. Further to the south of Khafji the corals at surveyed sites did not show any of the stress described in paragraph 22 above. Similarly, other parts of the coral reef community, including fishes, macroalgae and invertebrates, showed no signs of unusual stress in May 1992. Another individual observation indicated that spawning of *Acropora* species found on reefs in the path of the oil was not impaired during 1991 or 1992. It is possible that surface oil may have affected the reproductive products of corals and other reef organisms found at the sea surface after spawning. Scientists working in Saudi Arabia reported significant mortalities of reef corals during early 1992, however these were attributable to natural stresses. In general, reefs in nearshore areas throughout the region live under greater stress than those of the offshore islands. Based on previous studies, it is believed that oil spills that strike shallow subtidal reefs at extremely low tides, or which coincide with the mass spawning of corals and other coral reef organisms, may pose a much greater risk to coral reef organisms.

Effects on seagrass and algal mats

24. Three species of seagrass were examined (*Halodule unireivo*, *Holoplaeta ovolis* and *Holophila stipalacea*). Leaf tissues were incubated for 12-18 hours in the seawater-soluble fraction of Kuwait crude oil at a strength of 1 per cent (volume/volume); 170 different types of crude oil solution were used. There were no significant effects on the respiration or photosynthesis of the seagrass. These results, coupled with the field observations during the "Mount Mitchell" cruise, suggest that the oil had little effect on the subtidal seagrasses of the northern part of the ROPME sea area. In general, the seagrass systems studied appear to be thriving.

25. Concerning algal mats, damage was concentrated on the upper intertidal zone. In general, extensive damage was exclusive to algal mats in unprotected environments. Recovery from oil pollution was detected in Tanajib and the Abu Ali area.

Effects on Fisheries

26. The biological studies undertaken during the "Mount Mitchell" cruise were concentrated in the western ROPME sea area in order to be able to relate impacts of the 1991 oil releases to those areas and habitats where oil release occurred. In view of this limited geographic coverage, and because of the limited number of fish and plankton samples collected, it is still premature to establish geographic trends along the western margin of the area. There were few unequivocal effects of oil pollution that were attributable solely to the 1991 releases. However, in some of the studies there were tantalizing suggestions that localized pollution did exist. Natural variability between the sampling locations needs to be better understood, especially with regard to the plankton, so as to separate natural population distributions from changes caused by pollution or other stresses. In addition, the question of whether there has been a general decline in the region's fish and shrimp stocks is yet to be addressed.

27. A definitive understanding of possible risks to human health from polynuclear aromatic hydrocarbons associated with fishery products requires a considerable amount of additional information on consumption patterns, food preparation techniques, dose-responses and hydrocarbon distribution in the products. However, current thinking in the ROPME sea area and experience from oil pollution studies in other parts of the world suggest that commercially caught fishery products do not constitute a health hazard to the average consumer.

B. *Atmospheric pollution, including long-term effects on human health*

28. The studies and surveys on atmospheric pollution and its impact on human health carried out by WMO and WHO under the United Nations Inter-agency Plan of Action continued beyond the 90-day first phase of the Plan of Action (20 April - 21 July 1991) in order to allow for further analysis of the results, particularly with respect to a possible impact on human health.

29. At a meeting of experts to assess the atmospheric effects of the Kuwait oil fires, organized by WMO in cooperation with UNEP (Geneva, 25-29 May 1992), the results of extensive aerial reconnaissance surveys of the fire plumes, were analysed. The surveys had been carried out by teams of investigators, from different countries. At the same time, the experts analysed meteorological and air pollution measurements in and around the source region, with a view to obtaining a better understanding of the atmospheric effects of the oil well fires. Further insights into plume behaviour and its long-range transport were provided by modelling. The major findings of the above expert meeting[2] concerning atmospheric pollution from Kuwait oil fires and its consequences are summarized in paragraph 30-41 below.

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[2] Report of the Second WMO Meeting of Experts to Assess the Response to and Atmospheric Effects of the Kuwait Oil Fires (Called in collaboration with UNEP). WMO, Global Atmosphere Watch No. 81, Ref. WMO/TD-No.512, 1992.

Effects on global climate

30. The base of the smoke plume was generally at a height of between 0.5 and 2 km and its summit was never detected above 6 km. The smoke particles coagulated as they were transported downwind. They became hydrophilic as a result of being coated with sulphate, whereby substantially increasing the efficiency of their removal by clouds and rain. Because of its relatively low altitude and short residence time, due to capture by water vapour, the smoke did not have any attributable effect on the weather or climate outside the Persian Gulf region. There has also been no demonstrable influence on the Indian monsoon.

31. During the period the fires burned, the total emissions of carbon dioxide are estimated to be 3×10^8 tonnes, which is about 1.5 per cent of the world-wide annual emissions from fossil fuel and biomass burning. The carbon dioxide and nitrous oxide emissions steadily diminished as the burning wells were brought under control. The calculated effect of such carbon dioxide emissions on global warming is so small that it will be immeasurable.

Effects on regional and local weather

32. The smoke plume widths ranged from 15 to 150 km for distances of 0 to 1,000 km from the fires, reducing ground-level sunlight, visibility, and the temperature beneath the plume. Although local and regional temperatures and solar flux were reduced under the plume, there is no evidence that regional weather was consistently affected.

Plume concentrations and chemistry

33. Within the composite smoke plume, peak concentrations of particulate mass exceeded recognized occupational health standards. Sulphur dioxide occasionally exceeded the standards stipulated. The peak concentrations of ozone, nitrogen oxides, and carbon monoxide were below stipulated standards. Consequently, because the plume remained above the ground for most of the time, these conditions were experienced for short periods mainly by those who flew through the plume. There was no impact on the region's population.

34. The plume was not photochemically active until it had travelled over 200 km. Inside the plume 1,000 km downwind of Kuwait, the ozone concentration occasionally exceeded the United States National Ambient Air Quality Standard (NAAQS) of 120 ppb. However, there is no indication of regional oxidant episodes resulting from the fires. Regional ozone concentrations were not substantially elevated and there was no impact on the region's population.

Ground-level concentrations and their relation to human health

35. The concentrations of total suspended particulates (TSP) and particulate matter (PM-10) often exceeded the local and other recognized standards in the region. These concentrations were often higher in Daharan than in Kuwait City. However, occurrences of high concentrations of particulate matter have been common in the region, making it difficult to determine the contribution from the oil well fires without chemical analysis. Initially, there was concern that the increased TSP and PM-10 concentrations would severely impact on health, but levels were not high enough to cause observed acute health effects. Active irritating agents were significantly absent from the particles.

36. In Kuwait and Saudi Arabia the ground-level concentrations of nitrogen dioxide, nitrogen oxides, carbon monoxide, hydrogen sulphide and ozone did not exceed the local and recognized standards. There were instances in which sulphur dioxide concentrations exceed the local standards. Initially, there was concern that pollutant gases from the fires would have acute effects on health. However, generally the population was not exposed to persistently high concentrations of gases. Ground-level concentrations were comparable to recognized air quality standards designed to protect public health and welfare, and reports of widespread and acute effects on health were not substantiated.

37. In-plume and (ground-level) ambient air concentrations of polycyclic aromatic hydrocarbons (PAHs) and metals such as nickel, chromium, vanadium, and lead from the fires were usually below 1 ug/m^3, i.e. comparable to those in urban-industrial areas in Japan, Western Europe and the United States.

38. There is no indication that acidic precipitation occurred on the Arabian Peninsula due to the fires; however, it may have occurred in Iran. There is no firm evidence of an influence on precipitation acidity outside the ROPME region.

39. Soot and oil mist covered the soil surface and vegetation in large areas, with the soot-affected area extending into Saudi Arabia. Most of the native vegetation in the soot-affected areas was adversely affected. The annual flora failed to set seed. Only some perennial vegetation with food-reserve in the roots survived the summer of 1991. The long-term impacts of soot and oil deposition are unclear, but there are indications that vegetation is being re-established effectively. However, there might be a change in the distribution of species.

Immediate and long-term effects on human health

40. Air pollution resulting from the burning oil wells in Kuwait represented a potential hazard to human health. However, the last of the 613 burning wells in Kuwait, which were the main source of concern with regard to air pollution and risk to human health, was put out in record time on 6 November 1991. Consequently, the atmospheric conditions and air quality in Kuwait and the adjacent areas improved rapidly and significantly. This considerably reduced the risk to human health.

41. In addition, in view of the fact that the smoke plume was, on average confined to heights between 500 m and 4 km above ground level (only on one occasion was it detected at 6 km), and that the plum rarely touched the ground, the immediate hazard to human health was drastically reduced. Nonetheless, possible long-term effects are still uncertain and, therefore, long-term, detailed studies of the pollutants themselves and of the exposed population are required.

C. *Terrestrial ecosystem inc uding hazardous wastes*

42. Initial surveys of the terrestrial ecosystems in the areas affected by the conflict were carried out under the United Nations Inter-agency Plan of Action during August-September 1991 by UNEP (Terrestrial Ecosystems Branch (Soil Unit) and the Regional Office for West Asia - ROWA). Three

comprehensive reports on the results of the survey and assessment mission in Iraq, Kuwait and Saudi Arabia were published by UNEP/Terrestrial Ecosystems Branch (Soils)/ROWA[3]. The main findings of these surveys are set out in paragraph 43-45 below.

Iraq

43. The shelling and bombing from air-raids and rockets led to the complete destruction of the infrastructure, including power stations, water installations, oil refineries and oil storage depots as well as six oil wells. The consequences were:

(a) Drainage water pumps were put out of action, resulting in accumulation of drainage water, raising the water table and increasing soil salinity in vast agricultural areas;

(b) Destruction of fertilizer plants and other factories left the country without these important agricultural inputs;

(c) Toxic chemicals were spilled into soil and into running streams when several industrial plants were bombed;

(d) Both crops and livestock were very adversely affected. As no pesticides were available, the main crop, wheat, was attacked by pests, which reduced total production by about 40 per cent. Livestock was devastated by serious epidemics, e.g. rinderpest. Sheep herds were either subjected to overslaughtering or taken to neighbouring countries by fleeing pastoralists seeking higher prices. The rangelands of Iraq, especially of the west desert, have been drastically affected and degraded.

Kuwait

44. Serious damage to the terrestrial ecosystem was observed in Kuwait. The consequences of this damage were:

(a) The soot and oil mist coming out of the burning oil wells have covered the soil surface and vegetation over large areas. The area affected by soot was observed in the Burgan oilfield and along the Ahmadi - Wafra road towards the south;

(b) Most of the native vegetation in the areas affected by soot has been adversely affected. The annual flora failed to set seeds. Only some perennial vegetation with food-reserve in the roots was alive, but all other perennial vegetation was either killed or severely damaged;

(c) Oil escaping from exploded wells accumulated to form oil lakes extending over large areas of the desert, in some cases with depths of up to 1 meter or more. Oil penetrated into the soil below. The depth of oil penetration varies from a few centimetres to one metre, depending upon the nature of the soil and depth of oil at the collection site;

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[3] A Rapid Assessment of the Impacts of the Iraq-Kuwait Conflict on Terrestrial Ecosystems. Part I: Iraq; Part II: Kuwait; Part III: Saudi Arabia. UNEP/Terrestrial Ecosystems Branch (Soils)/ Regional Office for West Asia, Bahrain, September 1991.

(d) The sandy oil belt around Kuwait Bay and along the coast has been disturbed by military activities. The affected soils have been further exposed to wind erosion. Pulverization of the surface soil by off-road military vehicles in other areas destabilized the soil, increasing its vulnerability to wind erosion;

(e) Disruption of irrigation in afforested areas in the north of Kuwait City caused severe damage to young plants.

Saudi Arabia

45. The area affected by soot lay south of the Saudi Arabia-Kuwait border and to the east of a line passing through Nairyah down to Al-Dammam and parallel to the Persian Gulf coast. The following are the main observations on the consequences of the damage caused by the war:

(a) The limited oil spills on the land have an influence on the halophytes growing in the salty areas (sebkhas);

(b) The sandy soil belt along the coast has been disturbed by military activities;

(c) Vehicle movements have pulverized surface soils, exposing them to erosion from both wind and water. In many sites, the soils have been extensively compacted;

(d) The adverse effects described earlier have taken appreciable areas out of grazing, thus increasing the gravity of overgrazing which, in addition to severe soil disturbance, has caused the disappearance of perennial plants;

(e) Death of *Hammada elegans* and other species are dying in the Al-Khafji area due to dense soot fallout and, possibly, oil mist. The death rate among the vegetation decreases as one proceeds away (southward) from the source;

(f) Vegetation seed productivity has been reduced by the soot.

46. The above findings of the initial surveys conducted under the United Nations Inter-agency Plan of Action were confirmed by a independent study carried out by the Environmental Protection Department (EPD) of the Ministry of Public Health of Kuwait. The EPD study showed that from 76 gushing oil wells, over 100 oil pools were formed covering a total area of about 16 km^2. The areas between the pools were also soaked by oil. The depth of the oil pools varied according to the local topography of the areas and was generally between 30-50 cm, with a few as deep as one metre. Estimates of the quantity of oil accumulated in these pools range between 25 and 50 million barrels.

47. The air immediately above the oil pools contained a much higher level of methane and non-methane hydrocarbons, detected by the air quality monitoring system run by the EPD. Of particular concern, especially with respect to health impacts, was the level of toxic chemicals and PAHs. However, investigations showed that most PAHs in the air particulate samples in Kuwait and Saudi Arabia were, in general, below detectable levels.

48. Deep and surface soil samples were collected from within and outside the oilfields by the EDP. The samples were analysed to determine the level of total removable organic matter, petroleum hydrocarbons and chrysene equivalents. As expected, much higher levels were detected in the surface samples collected from the oilfields, with much lower levels in the deep samples.

49. With respect to hazardous wastes, the initial surveys carried out by UNIDO indicated that the risk to the environment and human health will remain fairly acute until plans are designed and implemented to assess and clean up the disposal sites, both in Kuwait and Iraq, each according to its particular characteristics.

50. Some media reports (January 1993) have indicated that there is the possibility that depleted uranium shells (penetrators) might have been used during the conflict between Iraq and Kuwait, posing a serious threat to human health in these countries. The reports have not yet been confirmed by independent sources. However, in view of the danger such shells may present to human health and to the environment in general, the matter is now being investigated by UNEP in cooperation with WHO, IAEA and the Governments concerned, in order to validate the media reports and, if appropriate, advise on suitable measures.

III. SOCIO-ECONOMIC ASPECTS

51. The conflict between Iraq and Kuwait, the associated hostilities and the resulting environmental damage have had serious socio-economic impacts on the countries of the region and beyond. The implications for the countries affected range from loss of job opportunities, particularly in the fisheries, agricultural and industrial sectors, to threat to human life from the presence of unexploded ordinance and sea and land-mines.

52. UNDP, in decision 91/21 of the 38th session of its Governing Council, requested that a funding strategy meeting be convened to consider a draft proposal for the socio-economic and environmental recovery of countries affected by the conflict between Iraq and Kuwait, with a view to establishing a funding strategy. In that connection, UNEP prepared a Consolidated Rehabilitation Programme, containing a proposed programme for the environmental rehabilitation of the region, the implementation of which would assist in the alleviation of the above socio-economic problems.

IV. UNITED NATIONS FOLLOW-UP INITIATIVES

53. While the United Nations inter-agency efforts were being undertaken at the technical level, further attention was being paid to the political and financial aspects of the environmental crisis. In that context, and following a request from the Government of Kuwait, a first visit to Kuwait was undertaken by the personal representative of the United Nations Secretary-General in early October 1991.

54. The Consolidated Rehabilitation Programme for the environment of the ROPME region, as well as a priority action programme, prepared by UNEP in cooperation with ROPME, incorporated costed and targeted project proposals covering the three environmental components, technical cooperation aspects, and the needs of the countries of the region with respect to oil clean-up, recovery and restoration. The Rehabilitation Programme was presented by UNEP

to a funding strategy meeting organized by UNDP on 16 December 1991. At that meeting, the urgent need for rehabilitation of the environmental in the region was brought to the attention of some 70 Member States of the United Nations, including major potential donors.

55. The issue of environmental rehabilitation was later brought up at the third special session of the Governing Council of UNEP, where it was also made clear that dealing with such an environmental catastrophe went beyond the capabilities of the countries of the region, and thus required strengthened international cooperation. Furthermore, and in order to keep the environmental crisis at the forefront of the international political arena, the Secretary-General requested his special representative to visit Kuwait during March 1992, and later the other countries of the region, to reassess the situation after the capping of the burning oil wells. The visit to Kuwait was carried out from 29 to 31 March 1992, during which the Secretary-General's special representative, accompanied by a senior staff member of UNEP, held talks at the highest possible level. The Government was assured of the continued support of the United Nations and all its organizations in finding adequate measures to redress the environmental damage in Kuwait and the region.

56. Recognizing that the task of environmental rehabilitation is challenging and that the financial resources needed are very large, during the short visit, the Secretary-General's representative discussed various options for rehabilitation strategies and funding possibilities. The outcome of the visit has been brought to the attention of the Secretary-General and the Executive Director of UNEP, in order for an acceptable strategy to be formulated and applied as soon as adequate resources become available.

57. In addition to mitigating the adverse effects, rehabilitating the environment and building up the national response capabilities, there is also an obvious need to develop an effective international mechanism to guide and coordinate the response to future large-scale environmental crises. Such a response should be based on a predetermined procedure to initiate immediate action and on the criteria to be applied to trigger an international response. Experience from dealing with the conflict between Iraq and Kuwait, with all the complexity of its environmental consequences, showed that the United Nations agencies can work together effectively if the objectives of the joint action are laid out, the distribution of responsibilities is clearly defined, and a strategy for coordination, communication and data management is developed and implemented from the outset.

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ITEM 7:* PROGRAMME MATTERS, INCLUDING THE IMPLEMENTATION OF THE PLAN OF ACTION TO COMBAT DESERTIFICATION

WORLD ENVIRONMENT ACADEMY

Report of the Executive Director

1. The Executive Director has prepared the present report on the world environment academy, as requested by the Council in its decision 16/8 of 31 May 1991. The idea of creating a world environment academy was first discussed at the Informal Ministerial Consultation convened by the Executive Director in January 1989, and again at a second Consultation in January 1990. It was received with interest and the Consultation meetings requested the Executive Director to pursue the idea. Consequently, the Executive Director submitted proposals on the issue to the Governing Council at its second special session (UNEP/GCSS II/2) and at its sixteenth regular session (UNEP/GC.16/4/Add.3 and Corr.1 and 2).

2. In compliance with decision 16/8, in which the Council requested the Executive Director to bring the matter to the attention of the Preparatory Committee for the United Nations Conference on Environment and Development (UNCED), the Executive Director submitted the relevant information to the Committee. No reference is made to the possible establishment of a world environment academy in the final documents of UNCED, nor in Agenda 21, as adopted at UNCED and subsequently endorsed by the General Assembly at its forty-seventh session.

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* Refers to the number of the item on the Provisional Agenda (UNEP/GC.17/1).

3. In December 1992, the Executive Director held a high-level consultative meeting in New York with a number of his colleagues from the United Nations and the scientific community, including representatives of the United Nations University, the Scientific Committee on Problems of the Environment (SCOPE), and the Royal Academy of Sciences of Sweden, to explore further the feasibility of establishing a world environment academy.

4. The idea of the academy received general support at that high-level consultative meeting and each participant expressed willingness to continue working with UNEP on its design and development. Some participants saw it as being immediately useful in helping to bridge the gap between science and policy, a matter that could become increasingly critical in responding to the challenge posed by sustainable development.

5. In view of the number of post-UNCED developments and of the financial and institutional implications for UNEP of the possible establishment of a world environment academy, the Executive Director proposes to keep the issue under review and to come back to it at a later stage.